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Essays on group lending: evidence from Jordan

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ESSAYS ON GROUP LENDING: EVIDENCE FROM JORDAN

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Abstract

Group lending has received a great attention from economists and policymakers for its successful delivery of credit to poor borrowers and its role in alleviating poverty in the developing countries. The success of group lending in providing credit to poor borrowers has been attributed to its ability to mitigate the asymmetry of information and enforcement problems in credit markets. The ability of group lending institutions to overcome the asymmetry of information and enforcement problems has been theorized to be the driving force behind their outreach to the poor, their sustainability, and their repayment performance. While there is a host of theoretical models explaining the success of group lending, empirical research has lagged behind. The focus of this thesis is to explore the determinants of repayment rates in group lending institutions taking the case of one Jordanian institution.

We use data from a self designed survey of 160 borrowing groups of the Microfund for Women in Jordan to test the effect of screening, peer monitoring, group pressure, and social ties on borrowing groups' repayment behavior. Two measures of repayment from the data base of the Microfund for Women are used. We find that these theoretical variables of interest are indeed important in explaining repayment behavior.

This thesis investigates the impact of differences in the behavior of different group members on the repayment performance of the group. The survey data allows us to analyze whether the impact of joint liability, screening and monitoring activities and social ties of the group leader on repayment performance differ from those of the rest of the group members. We find that the group leader has a more significant impact in improving the repayment behavior of the group than the rest of the group members.

Chapter 1

Introduction

The World Bank has estimated that in 2001, 1.1 billion people had consumption levels below $1 a day and 2.7 billion lived on less than $2 a day. Many believe that credit can play a vital role in reducing poverty. This belief is based on the hope that the latent entrepreneurial capacity of the poor would be stimulated with the availability of small-scale loans. Such loans could help the poor to generate income, build viable businesses, mitigate their vulnerability to external shocks, and self-empower, especially women, to become socially and politically active. The poor, however, lack collateral, steady employment, steady flow of income, and a verifiable credit history all of which are minimum qualifications to gain access to the formal financial sector. The poor address their financial needs through a variety of informal channels. Credit, for example, might be available from the informal money lenders but usually at a very high interest rate.

One channel to deliver financial services to the poor is through microfinance. It is conceived to be an alternative to both formal financial sector, which in most developing countries serve less than 20% of the population (Gallardo, Outtara, Randhawa and Steel (2003)), and informal sources such as moneylenders. Microfinance is the provision of small loans (microcredit) and other financial services to low income clients to help them engage in productive activities or grow their small businesses. Microfinance differs in key concepts from conventional banking in that it employs different collateral substitutes to deliver and recover loans. Such collateral substitutes include group lending, dynamic incentives which allow the loan size to increase over time upon satisfactory repayment, mandatory savings, and regular repayment schedules. These collateral substitutes are important for both the poor borrowers who usually lack enough collateral and available credit history and for lenders operating in countries with weak law enforcement.

Beginning in the 1950s, many poverty alleviation programs began to introduce subsidized credit. These programs were rarely successful. They suffered massive erosion of their capital base due the high cost of subsidies, the low loan repayment rates, and the diversion of credit from the intended recipients to the hands of the better off (Adams, Graham, and Pischke (1984)).

In 1974, professor Muhammad Yunus, founder of Grameen Bank, on a field trip with his students to a poor village in Bangladesh, met a woman who made bamboo stools for sale. Yunus learned that the women after repaying the money lender for the raw bamboos, sometimes at rates as high as 10% a week, was unable to support herself or her family. He also learned that there were many women in the village suffered from a similar situation. Yunus realized that had these women were able to borrow at some advantageous rates, they would have been able to raise themselves above poverty level. Taking the matter into his own hands, Yunus lent the equivalent of $ 27 to 42 women from his own pocket. Shortly after that, the women were able to repay the loans and continued to support themselves and their families. This success originated the embryonic idea behind the Grameen Bank and the concept of microfinance. As of July 2005, Grameen Bank disbursed $ 4.94 billion in loans to 5 million, 96 percent were women.

Microfinance emerged in the 1970s as a social innovator providing financial services to the working poor, those who were previously considered as poor repayment risk or "un-bankable." These services include providing small loans (microcredit), saving and insurance with microcredit loans being the most common microfinance product. By December 31, 2004, 3,164 microfinance institutions (MFIs) have reported reaching 92,270,289 clients, 66,614,871 of whom were considered among the poorest (those who were in the bottom half of their country's poverty line or below $1 a day) when they took their first loan. Of these poorest clients, 83.5 percent were women. Table 1 shows the expansion of the MFIs and the number of clients reached worldwide. [1]

[1] Source: State of the Microcredit Summit Campaign Report 2005

Table 1: MFIs Expansion

Year	Number of MFIs	Number of Total Clients in Millions	Number of Poorest Clients in Millions
1997	618	13.5	7.6
1998	925	21	12.2
1999	1,065	23.6	13.8
2000	1,567	30.7	19.3
2001	2,186	55	26.9
2002	2,572	67.6	41.6
2003	2,931	80.9	54.8
2004	3,164	92.3	66.6

Note: Numbers of MFIs and Total Client Numbers Reporting to the Microcredit Summit

Much research has shown that microfinance reduces poverty. Hossain (1988) showed that the Grameen Bank services improved employment, income generation, and social indicators of its participants. Khandker (1998) and Pitt and Khandker (1998) used a joint research project of the Bangladesh Institute of Development Studies and the World Bank 1991/1992 survey data and found evidence that microfinance programs in Bangladesh help the poor through smoothing consumption and assets accumulation. This research found that microfinance promotes investment in human capital, raise awareness of health issues, and helps women acquire assets of their own and empower them in household decision making. To assess the sensitivity of the earlier findings on the microfinance impacts on poverty, Khandker (2005) carried out an impact assessment using the 1998/1999 follow-up survey to the 1991/1992 survey done by the Bangladesh Institute of Development Studies and the World Bank. He found that poverty among poor borrowers of the microfinance programs continues to decline. A study by Townsend and Kaboski (2006) showed that families in Thailand with access to credit invested and consumed more than those without access to credit. A broad examination of multiple programs across multiple regions by the Consultative Group to Assist the Poor (CGAP) concludes that microfinance is an effective strategy to reduce poverty.

MFIs have two major lending methodologies; group and individual lending. Group lending involves lending to a group of borrowers who are jointly liable for a loan. It creates its own type of

collateral and has received a lot of attention from economic theorists and policymakers. Individual lending often requires collateral that the poor borrower can pledge; the value of the collateral and the loan size may not be closely related. Both lending methodologies use different mechanisms to secure high repayment rates. These include joint liability, dynamic incentives, mandatory savings, and regular repayment schedules. Joint liability helps to overcome adverse selection, moral hazard, and enforcement that impede a lender from providing credit to borrowers. Since group members are jointly liable for a loan, group lending creates incentives for individual group members to screen out risky borrowers, monitor each others' actions and enforce repayment. Using dynamic incentives allows the loan size to increase over time upon satisfactory repayment. The incentive to get a larger loan size and the threat to cut off any future lending if loans are not repaid can improve repayment. Dynamic incentives can be used in both group lending and individual lending programs. Some MFIs require that borrowers save a percentage of their loans that can be withdrawn upon leaving. These savings can serve as partial collateral since the program can use them to secure any unpaid loans. One feature of many MFIs is that small amount of repayments starts shortly after disbursement based on weekly or biweekly schedules. Regular repayment schedules can function as screening device against undisciplined borrowers and as an early warning to the program about potential repayment problems. They also pressure borrowers to prioritize repayment before cash is consumed or diverted.[2]

All these collateral-substitute mechanisms contributed to the high repayment rates that are in excess of 95 percent as reported by major microfinance institutions. Data from the Micro Banking Bulletin shows evidence against the conventional wisdom that lending to the poor is risky; after adjusting for inflation and taking out subsidies received, 63 of the world's top MFIs had an average rate of return of about 2.5% of total assets. This compares favorably with the returns in the

[2] Morduch (1999) provides an excellent review of these mechanisms.

commercial banking sector (CGAP). Many MFIs proved that financial services to the poor can cover their full costs through appropriate interest pricing, enhancing efficiency, and relentless focus on repayment.

High repayment rates benefit both the MFI and the borrower. They allow the MFI to cut the interest rate on loans which reduces the cost of credit to borrowers and allow them to have more access to it. High repayment rates help reduce dependence on subsidies from donors and improve sustainability level of the MFIs. Since many MFIs are still dependant on donors' subsidies, good repayment performance is a key variable for the MFIs to keep the sources of fund open as it reflects a good signal to the donors and international funding agencies of the MFI's worthiness.

Group lending received a great attention from economists and policymakers for its ability to solve the asymmetry of information and enforcement problems that face the financial institutions in developing country. While there is a host of theoretical models explaining the success of group lending programs, empirical research has lagged behind. This thesis contributes to the joint liability literature by investigating whether the theoretical models and the data tell a similar story. The thesis uses a self designed survey that the researcher carried out in spring of 2005. Among other questions, the survey contains questions that capture the activities of screening, monitoring, and enforcement and social ties among group members of 160 groups from the Microfund for Women in Jordan. The survey questions are in the appendix of this thesis. The survey data are used to show if group lending mitigates asymmetry of information and enforcement problems faced by lenders.

In specific, chapter 2 uses the data to investigate whether group members improve repayment performance through their group-wise actions of screening, monitoring, contract enforcement, and the use of social ties among each others. In doing so, we abide with the theoretical work that assumes all group members work together to ensure good repayment performance.

In most group lending programs, group members of a borrowing group select a group leader after the group is formed. The data allows us to investigate whether the effectiveness of joint liability, screening and enforcement activities and the use of social ties effects on repayment performance differ across different group members. In particular, chapter 3 analyzes whether the provision of these activities and their effect on repayment performance differ between the group leaders and the rest of the group members.

Chapter 2

Repayment Performance in Group Lending: Evidence from Jordan

2.1 Introduction

In the last couple of decades, a growing range of financial institutions have developed an alternative lending mechanism that has turned around the conventional wisdom that lending to poor households is doomed to failure.[3] Microfinance institutions (MFIs) as these are called share a commitment to providing poor households with very small loans to assist them start productive activities or grow their current small businesses. MFIs extend credit to poor household through innovative use of information that potential borrowers may have about each other resulting in high repayment rates. The hope is that much poverty can be mitigated by extending credit and financial services to poor households.

In most developing countries poor households usually have no access to the formal banking system. The formal banking system has three major problems in extending credit to such borrowers: inability to assess the risk type of potential borrowers (screening), to ensure that the loan, once made, is utilized productively (monitoring) and to ensure the repayment of loans if borrowers are reluctant to do so (enforcement). Note first that the poor in general cannot meet the collateral requirements stipulated by the banks. Second, the inherently high cost to banks of screening and monitoring the actions of the poor and to enforce contracts may all contribute to the exclusion of the poor from the credit market.

MFIs primarily follow a specific format for extending credit to the poor – they lend to a self-selected group of entrepreneurs who are jointly liable for a loan. Since group members are jointly

[3] Among these pioneer financial institutions are the Bangladesh's Grameen Bank, BancoSol of Bolivia, and the Bank of Rakyat Indonesia where the repayment rates in these institutions are above 95%. See Morduch (1999) for a review of these microfinance institutions.

liable for a loan, group lending creates incentives for individual group members to screen out risky borrowers, monitor each others' actions and enforce repayment. Essentially, by replacing physical collateral with a form of social collateral, it considerably lowers the cost of the loan for the lender. The borrowers have more information about each other and hence can successfully solve the asymmetric information problem that plagues the lenders.

While a host of theoretical explanations exist to account for the success of group lending programs, empirical research has lagged behind. In an attempt to fill the gap between the theoretical and empirical research, this paper examines the significance of screening, monitoring, group pressure, and social ties on borrower group performance. The data was obtained by the researchers through a survey of 160 groups carried out in cooperation with the Microfund for Women (MFW), a group lending institution in Jordan.

The rest of the paper is organized as follows. Section 2.2 reviews the relevant literature in group lending, while section 2.3 provides an overview of microfinance in Jordan as well as a description of the group lending methodology of the MFW. Section 2.4 describes the data collection process and the variable construction. In section 2.5 empirical results are presented with section 2.6 containing some concluding remarks.

2.2 Review of the Related Literature

The literature on group lending is quite substantial. Here we provide a brief overview of some of the theoretical papers. The last part of this review examines the small but growing number of empirical papers on this topic.

Credit rationing and collateral requirements are primarily responsible for the exclusion of poor borrowers from the credit market. As shown in the seminal paper by Stiglitz and Weiss (1981), liberalizing interest rates, or using collateral requirements to loosen credit rationing results in adverse selection and moral hazard problems. By definition the poor have limited supplies of tangible assets.

Their likely failure to meet collateral requirements makes the lenders' job of screening the poor borrowers a difficult mission. One innovation to extend credit to the poor that simultaneously addresses the asymmetric information problem and enforcement concerns lies in group lending; lending to self-selected groups of entrepreneurs who are jointly liable for a loan. Groups form voluntarily, and, while loans are made to individual in the group, all members of the group are held responsible for loan repayment by the entire group. Many theoretical papers have stressed group lending's informational and enforcement advantages over individual lending. Since group members are jointly liable for loan repayment, group lending can achieve better screening to dilute adverse selection, induces peer monitoring to contend moral hazard and provides group members with incentives to enforce loan repayments (Ghatak and Guinnane 1999).[4]

Ghatak (1999) and Van Tassel (1999) are representatives of models that explore the adverse selection problem. They show how group lending can take advantage of the "inside" information that only borrowers have about each other, to draw in relatively safer borrowers. As a result repayment rates and efficiency are higher under group lending than individual lending (Ghatak 1999).[5]

Another strand of papers focuses on monitoring and moral hazard issues under group lending. Varian (1990) analyzed how borrowers mutually monitor each others' projects to ensure the success of financed projects and how monitoring reduces some of the barriers and information asymmetry between the lender and the borrower. Stiglitz (1990) shows that group lending, via monitoring, alleviates the moral hazard issues involved in lending to those with no collateral. Stiglitz's model shows how group lending can increase the choice of safer projects by inducing a borrower to encourage a partner to choose a safer project. Banerjee, Besely, and Guinnane (1994)

[4] This exhaustive survey also provides an excellent introduction to the theory and practice of group lending.

[5] If group members do not have complete information about each other, then group lending may not lead to any improvements in loan repayment rates. This has also been shown in Laffont and N'Guessan (2000).

show that the burden of moral hazard problem between a borrowing member and the lender falls on the monitoring members who are responsible for repaying the loan of the defaulting member. They show that with an increasing cost of monitoring, a monitor can impose higher penalties on the borrowing member in the case of default, giving the borrowing member an incentive to choose a safer project.

Another set of theoretical papers focus on the strategic default strategies of group members. In the Besely and Coate (1995) model borrowers choose whether to repay or not after realizing projects returns by comparing the repayment amount with the severity of the official penalties imposed by the lender, and the unofficial penalties imposed by the other group members and the community. They show that group lending can improve repayment rates relative to individual lending given that social penalties are strong enough. Aghion (1999) argues that monitoring and the threat of social sanctions can prevent strategic default in group lending. In this model, a borrower can verify her partner's true project returns at some cost and inflict sanction upon default. I now move on to the empirical part of this research.

On of the earliest empirical papers by Wenner (1995) used data from 25 Foundation for International Community Assistance (FINCA) credit groups in Costa Rica to study group lending as a means of transmitting information on borrower creditworthiness. The relationship between repayment rates and explanatory variables was examined internally, that is between members and the credit group and then externally, between the group as a whole and FINCA, the credit institution. Wenner found that groups that screened on the basis of an internal written code of regulations had better internal as well as external repayment rates than those that did not. Also, groups that lived in better off towns in terms of infrastructure had worse repayment performance indicating that those groups may have alternative credit sources and value the FINCA services less.

Around the same time in another paper Sharma and Zeller (1996) investigated the determinants of repayment performance of 128 credit groups belonging to three group-based credit programs in Bangladesh. Their main findings include the significance of the effect of risk diversification, credit rationing, screening, and social ties on repayment performance. They found that high degree of credit rationing and unfulfilled credit demand, improves repayment performance since it generates incentives for protecting higher expected credit in the future. However, higher degree of credit rationing which renders the loan size trivial worsens repayment. Not surprisingly, groups formed endogenously, where screening is assumed to be more effective, were found to have better repayment rates relative to groups formed by credit institutions. Social ties, measured as the proportion of relative members in the group, has a negative impact on repayment supporting the hypothesis that it might be difficult to impose sanctions on relatives, which dilutes the enforcement process. Among other results, Sharma and Zeller also found that repayment rates are negatively associated with larger loan sizes.

Zeller (1998) which combines features of both Wenner (1995) and Sharma and Zeller (1996) investigated the effect of intragroup risk pooling and social cohesion on the repayment rate. The data used by Zeller was obtained from a random sample of 146 groups from six different group lending programs in Madagascar. While most Malagasy households grow rice in irrigated lowlands, rainfed uplands constitute more than half of the total landholdings in the sample household. Returns from uplands are highly variable while returns from irrigated lowlands are stable making uplands a risky asset while irrigated lowland a safe one. Intragroup risk pooling, the degree by which group members diversify the group's joint portfolio of assets, is measured by the coefficient of variation of upland possessed by members of the same group. Zeller's results showed that repayment rate increases with more diversification of the group's joint asset portfolio. However, there is an optimal point of risk pooling after which increased diversification leads to lower repayment rate because of

higher cost of monitoring. Therefore, the hypothesis that groups consisting of members with homogeneous risk exposure have higher repayment rates was rejected. Social cohesion, measured by counting the number of common characteristics among group members like social class, ethnicity, neighborhood, friendship and kinship, is found to improve the repayment rate.

Wydick (1999) analyzed the effect of peer monitoring, social ties, and group pressure on the provision of intra-group insurance, the mitigation of moral hazard within borrowing groups, and the group repayment performance. Using a sample of 137 borrowing groups of the Fundo Para o Desenvolvimento de Atividades Porturias from in and around the rural towns of Quetzaltenango and Totonicapan in Guatemala, Wydick's empirical results show that social ties have no effect in mitigating moral hazard within a borrowing group. They have a small effect on providing intra group insurance, and have no effect in improving repayment rates. Group pressure within groups exerts a significant effect in mitigating moral hazard, has a modest effect on the provision of intra group insurance, and has no effect on repayment rate. The empirical results show that peer monitoring is a primary factor in affecting group performance in terms of providing intra group insurance, mitigating moral hazard, and improving repayment rates. It is only peer monitoring that has a direct effect repayment rates. Repayment rates are improved through different channels in urban versus rural areas. In urban areas, repayments rates are improved through the stimulation of intra group insurance via more intensive peer monitoring. In rural areas, groups enforce repayment by deterring moral hazard through willingness to apply social pressure.

More recently, Godquin (2002) tested the explanatory power of social ties, group homogeneity, social intermediation, dynamic incentives and loan characteristics (loan size and loan duration) on group's repayment performance. Godquin used 1629 loan observations of borrowers from the Grameen Bank, Bangladesh Rural Advancement Committee, and Bangladesh Rural Development Board from Bangladesh. Two repayment measures were used: repayment on time with

a grace period of three months was used in the whole sample and repayment on time was used in the split sample (one regression per MFI). Godquin found that the effect of social ties within group members on repayment is negative while the effect of social ties of group members out of the group is positive. Social intermediation and group homogeneity in terms of sex, education and age have no significant impact on repayment in the whole sample. In the split sample, social intermediation and group homogeneity showed mixed effects on repayment. Credit rationing, a measure of dynamic incentive, showed a positive effect on repayment in the split sample. Group size had a positive impact on repayment on time. While the loan size showed a negative impact on repayment before instrumentation, the instrumented size of the loan presented a positive impact.

In a comprehensive paper Ahlin and Townsend (2005; henceforth AT) develop and test the implications of four representative models of joint liability lending. Two of these models: Stiglitz (1990) and Banerjee, Besley, and Guinnane (1994; henceforth BBG) highlight moral hazard problems that can be mitigated through joint liability lending and monitoring. The third one, Besely and Coate (1995; henceforth BC) relates strategic default or limited enforcement model. The lender cannot fully enforce repayment and borrowers decide whether or not to repay by comparing the repayment amount with the severity of penalties imposed by the lender and the community. The fourth model to be tested is Ghatak (1999) which describes how the joint liability contracts can partially overcome the adverse selection problem. AT examined both the predictions of variables already included in these models, and predictions of additional variables they introduced in a general way. AT introduced the loan size in the BBG's model, productivity in all four models, correlation of borrower output in Stiglitz, BC and Ghatak models, the degree of cooperation in the Stiglitz, BBG, and BC models, the availability of outside credit in both the Stiglitz and BBG models. Variables considered in some or all models or introduced by AT include interest rate, loan size, liability

payment, borrower productivity, screening ability, the ease of monitoring, the degree of cooperation, the availability of outside credit, and penalties for default.

The data used to test predictions regarding the determinants of the group repayment rate are from large cross section survey of 192 villages in Thailand conducted in 1997. The survey covers two contrasting regions; one enjoys a degree of industrialization and fertile land for farming; and the other is poorer and semi-arid. The survey data is from 262 joint liability groups of the Bank for Agriculture and Agricultural Cooperative and from 2880 households of the same villages. Nonparametric, univariate tests and multivariate logits methods were used to study the predictions of the models for repayment.

AT found that the joint liability payment amount has a negative effect on repayment rate which favors the Stiglitz and Ghatak models over BBG's. This finding supports the fact that higher joint liability amount under ceteris paribus conditions acts as an additional tax on success, since only the successful borrowers pay it. Due to insufficient variation and potential endogeneity problems, no attempt was made to establish a relationship between interest rate and repayment rate and loan size and repayment rate. However, they find evidence that is in line with Ghatak's inverted-U shape relationship between repayment rate and loan size. Education, a measure of productivity, improves repayment performance. This favors all four models. Their data does not reveal screening as a significant determinant of good repayment as predicted by Ghatak. Favoring the Stiglitz and Ghatak models, the covariance of output has a positive effect on repayment. The cost of monitoring variables show mixed results.

In the nonparametric comparisons and the fixed effects logit, the higher the percentage of group members living in the same village, the better was their repayment performance. On the other hand, the results show that the higher the percentage of relatives in the group, the lower the repayment. The first result favors BBG's model while the second contradicts it. Default penalties

show positive and significant effect on repayment which are in line with the BC model's predictions. Outside credit options, the availability of village-run savings and loan institutions, are negatively and significantly associated with repayment performance. This finding is in line with the Stiglitz and BBG models. Finally, AT found that cooperation tends to worsen repayment rates favoring the BBG and BC models over the Stiglitz's story. AT conclude that social structure that disables penalties can be harmful for repayment.

2.3 Microfinance in Jordan

2.3.1 Overview

The history of microfinance in Jordan has begun with the public sector provision of subsidized credit in 1959 by the Agricultural Credit Corporation (ACC). The ACC was founded for the purpose of providing loans, including micro loans, for the development of the agricultural sector. The first manifest microlending program was founded in 1965 by the Industrial Development Bank. Numerous microenterprise foundations were subsequently established: the Orphan's Fund in 1972, the Noor Al-Husain Foundation in 1985, the General Union of Voluntary Societies in 1986, the Near East Foundation and the Jordanian Hashemite Fund for Human Development (and Enterprise Development) in 1990, the Development and Employment Fund in 1992, and the UNRWA Microenterprise Credit Programme in 2002. A new government sponsored bank – the National Bank for Financing Small Projects, known as the "Bank of the Poor", is currently underway and is expected to provide subsidized credit. However, the client base, the market influence, and the subsidized credit available to the public sector microcredit programs have been declining over the last several years. Instead a number of privately owned MFIs that engage in sustainable financing have stepped in to fill this gap.

The concept of sustainable microfinance was introduced in Jordan by the Save the Children in 1994, when they launched the Group Guaranteed Lending and Savings Programs (GGL).

Encouraged by this success, a separate legal entity (the Jordanian Women's Development Society) was established in 1996, which commenced operations and subsequently became the Microfund for Women (MFW) in 1999. Soon after, three other microfinance institutions (MFIs) were also established: Jordan Micro Credit Company (JMCC) in 1999, Ahli Microfinancing Company (AMC) in 1999, and the Middle East Micro Credit Company (MEMCC) through the Cooperative Housing Foundation in 1998. Support for the sustainable microfinance industry in Jordan is primarily provided by the Access to Microfinance and Improved Implementation of Policy Reform (AMIR). The AMIR program is an innovative economic opportunity project funded by USAID and implemented in partnership with the Jordanian private sector and government. [6]

Although subsidized microcredit providers have a significantly higher share of the total amount of credit disbursed to microentrepreneurs, the newly established MFIs have a higher share of the total number of borrowers, close to 80%. A credit demand study in 2002 (AMIR Report, 2002) estimated the potential demand for microcredit at JD 220 million (JD 1 = $ 1.4). Based on effective demand, or ability to pay, the demand for microcredit was estimated at JD 86 million concentrated in urban areas and registered businesses. According to this study, the MFIs can potentially capture 90% of the market. As of March 2004, the four MFIs together were serving almost 17,000 clients for an outstanding portfolio of almost JD 9.7 million. We now proceed to discuss the largest of these MFIs which is also the data source for this study.

2.3.2 Microfund for Women

The Microfund for Women (MFW) is registered as a non-profit limited liability company with the Ministry of Industry and Trade since October 1999, and has a headquarter office and 9

[6] Along with technical assistance from AMIR, these four MFIs have achieved operational and financial self sufficiency by charging an interest rate that covers all costs. Operational self sufficiency is achieved by covering all administrative costs and loan losses from operating income while financial self sufficiency is achieved by coving all administrative costs, loan losses, and financing costs from operating income after adjusting for inflation and treating all funding as if it had a commercial cost (Charitonenko and Kristalsky, 2004).

branch offices serving major cities in Northern and Central Jordan. Initially, the MFW exclusively targeted low-income female clients with the vast majority of clients living in urban areas.[7] The MFW offers three types of loans: group loans, individual loans and seasonal loans. Individual and seasonal loans are approved and supervised by the headquarters while group loans are approved and supervised by branch offices. Since our focus is on group loans, a description of their group loan program is provided in Table 2.1.

Table 2.1: Description of Group Loans at the MFW

Loan Type	**Group Loans**
Creation Date	1996
Client Type	Urban
Collateral Requirements	Group guarantee
Repayment Schedule	Bi-weekly, monthly
Nominal annualized interest rate (first loan)	21% flat
Additional Fees (JD)	5
Loan Size Range (JD)	200-500
Average Loan Size (JD)	320
Loan Term range	28 weeks, 8 months

The Group Guaranteed Lending Product (GGL) offered by MFW utilizes the group lending methodology – individual borrowers themselves form a group that jointly guarantees the loan given to the group. The group members must know each other and respect the loan size caps by cycle and within groups, members may not be business partners or from the same family. The required group size is between 4-6 members, and the group loans on average, range between JD200 and JD500 per borrower. The initial loan size for all new members is on average JD200. The groups have the choice to make their repayments either in bi-weekly or monthly installments.

The MFW holds two basic meetings with the borrowing groups, one to fill initial forms and discuss policies, and the second to define group members' roles (leader and treasurer) and to review the loan contract orally. In the disbursement meeting at the MFW branch, clients are reminded of the contract policies. The group leader is appointed by the group members and functions as an

[7] Over the past three years, however, it has been expanding to include more registered businesses and even men, with the limitation that male borrowers cannot exceed 20% of the total client base.

intermediary between the group members and the loan officers. The group leader and the treasurer keep the accounts of the group, collect the installment payments from the group members and transfer these installments to the MFW designated partner bank. Being a group leader or treasurer does not generate any financial privileges.

To discourage delinquency, a late penalty of 3 JD per day, payable on the next payment date or at the end of the loan term are imposed. Delinquent cases are referred to court after 21 days.[8] As of March 2004, MFW was serving 10,720 clients for an outstanding portfolio of JD 2.5 million. Since its inception, the MFW has been successful in maintaining repayment rates above 98 percent in its group loans.

2.4 The Data Collection Process and Variable Description

2.4.1 The Data

During the months of February through May of 2005 I carried out a survey of 160 randomly selected borrowing groups of the MFW in Jordan. The survey covered two provinces, Irbid (north Jordan) and Al-Rusaifa (central-north Jordan). These two provinces were chosen due to financial and time constraints. Data on the loan size, the number of continuing, old, and new members in each group, and loan application dates were obtained from the MFW's data base. Also obtained from the MFW's data base were the number of installments, the due amount of installments, the due dates of repayment, the actual repayment amounts, and the repayment dates for each group. In Irbid the branch office, 84 groups were surveyed while in Al-Rusaifa the survey covered 76 groups. The survey was administered to group leaders as they walked in into these branches for loan transaction related matters. Sitting at the MFW branch office and waiting for a group leader to show up guaranteed that each possible group leader had the same probability of being selected in the sample.

[8] There were approximately 23 delinquent cases in court proceedings for the periods 2003 and 2004.

Three group leaders out of 163 refused to provide answers to the questionnaire. The survey took approximately 3 months while it took 3 weeks to obtain the data from the MFW branches.

2.4.2 Variable Description

2.4.2.1 Dependents Variables

We use two measures of repayment. Data on repayment were obtained from the MFW data base. Our first measure of repayment, *Delinquency*, is a binary dummy which equals one if a group had at least one late repayment, and zero if the group paid all installments on time up until the survey interview took place. The second measure of repayment is the sum of late days of repayment for each group up until the survey interview took place. We call this measure *Delinquency Intensity*. This measure gives a better idea of the overall repayment performance of the borrowing groups.

2.4.2.2 Independent Variables

In this section we divide the independent variables into five groups; control variables, screening variables, monitoring variables, social ties variables, and group pressure variables. Descriptive statistics for the dependent and independent variables are provided in Table 2.2.

Control Variables

At the time of the survey, different groups had different starting dates of receiving loans and therefore were at different stages of repayment. Time span of repayment performance is therefore not symmetric, with some groups having only one month of repayment history and other groups having eight months. When the interviews were conducted, 48 percent of the groups had repaid their installments on time (mean and median of repayment history during the current cycle are 5.96 and 8 months respectively).[9] Actual repayment rate at the end of the cycle is considerably higher, i.e., while late repayment is common, default is not. On average, each group has 3 days of late

[9] A loan cycle is the period between getting the loan and full repayment and varies between 8-10 months.

repayment. The MFW charges a fixed amount of 3 JD per late day which is the first remedial action taken against groups that fail to repay on time.

The explanatory variables used are summarized in Table 2.2. *Rephist* measure how far along a group is in its current loan cycle. If repayment occurs with some probability *p* each month, then groups with a longer history are more likely to have late repayment. Toward the end of the cycle, however, groups are expected to improve their repayment performance to be eligible for another loan cycle. Therefore, the effect of repayment history is a non-linear. Thus the log of repayment history (*ln*R*ephist*) will be considered in the empirical analysis.

Stiglitz (1990) assumed that the expected utility of a risky project increases faster in loan size than that of a safe project. This assumption guarantees that risky projects become relatively more attractive as loan size increases. By introducing loan size in the BBG (1994) model, Ahlin and Townsend (2005), conclude that higher loan has two opposite effects. Higher loan size increases the monitor's liability and thus his incentive to monitoring. It also increases the expected interest cost to the borrower more than his expected output inducing him to choose riskier projects. They also introduce loan size in Ghatak's (1999) model and find a similar contradictory effect. In our study, *Loansize* measures the group loan size in hundreds of JD. Following Ahlin and Townsend (2005), we consider the *Loansize* and it is square *Loansizesq*.

Ahlin and Townsend (2005) showed that Stiglitz (1990), BBG (1994), BC (1995), and Ghatak (1999) predict that higher borrower productivity increases repayment rate. Group leaders were asked to classify each group member into one of 6 categories: whether the member can read, have elementary schooling, preliminary schooling, high schooling, two year college, or four year college. Values from 1 to 6 were assigned to these different levels of education. The average educational attainment is close to 3 which corresponds to 9 years of actual schooling. Our measure of Productivity, *Education*, is a dummy variable that is equal to 1 if a group has an average

educational attainment of 4 or above. This measure allows us to directly compare the repayment performance of groups with higher education to groups with lower education.

Table 2.2: Variables Descriptive Statistics

Variable	Description	Mean	St. Dev
Dependent Variables			
Delinquency	Dummy = 1 if the group had at least one late repayment up to time of survey	0.525	0.500
Delinquency Intensity	Number of days of late repayment by the group up to time of survey	3.106	6.345
Control Variables			
Rephist	Number of repayments made or supposed to be made by the group during the current loan cycle	5.962	2.479
Loansize	Group loan size in hundreds of JD	15.76	4.19
Education	Dummy = 1 if the group has an average education of 4 and above	0.112	0.316
Branch	Dummy = 1 if the group belongs to Al-Rusaifa Branch	0.475	0.500
Land	The mean of the size of land owned by the group measured in hundreds of square meters	4.304	10.569
Religion	Percentage of groups who pray five times a day	0.867	0.215
Groupage	Number of years since the group took its first loan	4.037	2.571
Outside Credit			
Croption	Percentage of members with access to credit from individual outside the group	0.246	0.348
Screening			
Screen	Dummy = 1 if the group members rejected a borrower who would like to join them	0.568	0.496
Knowtype	Dummy = 1 if the group members know the quality of each others' work	0.950	0.218
Monitoring			
Samebus	The Probability that two members have same occupation	0.156	0.175
Relative	Percentage of relatives in groups	0.227	0.294
Phone	The percentage of group members with access to either land or cell phone services.	0.646	0.287
Group Pressure			
Pressure	An index of group pressure from 0 to 5	3.881	0.856
Coop1	An Index of cooperation between non-relatives from 0 to 6	3.193	1.348
Coop2	An Index of cooperation between relatives from 0 to 6	1.356	1.816
Social ties			
Socialties	An index of social ties from 0 to 6	5.381	1.273

Both Stiglitz (1991) and BBG (1994) have predictions on the effect of outside borrowing options on repayment rates. Groups with more outside borrowing options will have a higher loan size (from the primary lender and other outside options) giving group members greater incentive for

risky projects. Our measure of outside borrowing options, *Croption*, is the percentage of group members who have access to credit from individuals outside the group.[10]

To capture any differences in the repayment behavior of borrowing groups across the two branches surveyed, we include a dummy variable equals to one if the group belongs to Al-Rusaifa's Branch. We call this variable *Branch*.

While the MFW does not require assets ownership by the borrowing groups, such wealth indicators may improve the capacity of the groups to meet repayment requirements on time. We use land ownership to capture the wealth effect on repayment behavior. *Land*, measured in hundreds of square meters, is the mean land size owned by the group.

Cultural factors, like religion, may also affect the repayment performance of groups. All group members interviewed in the sample were Muslims. We attempt to measure religion intensity across groups by considering the percentage of group members who pray five times a day. We call this variable *Religion*.

Group age, called *Groupage*, is the number of years since the different groups took their first group loan. If each loan cycle increases the credit value to the borrowing groups, then one would expect the repayment performance to improve at each successive loan cycle. But if groups envision their relationship with the lending program as transitory, then the repayment performance will worsen for later loan cycles. Group age also can be a proxy for experience. The expected sign of *Groupage* is therefore ambiguous.

Screening Variables

Ghatak (1999) and Van Tassel (1999) develop models where group lending, via screening, can mitigate problems created by adverse selection. The key is that group formation displays positive

[10] We prefer to use outside credit options from individuals outside the group rather than from commercial banks. This is because such loans are harder to obtain and group leaders were not confident of their response to this question.

assortative matching under group lending schemes. Our measure for screening, *Screen*, is a dummy that equals one if the group has ever rejected a borrower who would like to join the group. In adverse selection models, and as necessary prerequisite for screening to function, borrowers are assumed to know each other's type in terms of risk. To capture this we use a dummy variable, *Knowtype*, that takes a value of one if members know the quality and sales of each other's occupation.

Monitoring Variables

Armendariz and Beatriz (1999), Ghatak and Guinnane (1999) and Banerjee, Besley, and Guinnane (1994) presented models in which peer monitoring mitigates moral hazard behavior of individual group members. Stiglitz (1990), in another peer monitoring model, deduce that the repayment performance in group lending programs is positively related to the members' homogeneity with respect to their projects' riskiness. Cost of monitoring is measured using different proxies. *Samebus* is the group occupational homogeneity. It is the probability that two chosen group members have the same occupation. The more homogeneous the group is, the easier to monitor. Based on the MFW 2003 annual report, the sector distribution of the MFW clients' enterprises during 2003 is as the following: 67% trade, 19% handicrafts, 7 % production and manufacturing, 5 % services, and 2% agriculture and live stock. Similar distribution was obtained from the survey data. Namely, 65.9% of the group members are involved in trade, 21.7% in handicraft, 5.8% in production and manufacturing, 4% in services, and 2.6% in agriculture and live stock. The majority of the empirical literature focuses on areas where the agricultural sector is the dominant, (Ahlin and Townsend (2005), Sharma and Zeller (1996), and Zeller (1998)). These studies focus on the risk pooling characteristic of occupational homogeneity while we focus on the cost of monitoring one. While it is easy to justify the correlation in output in the agricultural sector, it is more challenging to justify it in other sectors like trade. Group members with the same line of trade business (clothes trade, for example) may yet have different returns.

The second measure of cost of monitoring, *Relative,* is the percentage of members in the groups that are related to each other. Due to higher flow of information among relatives, the higher the percentage of relatives is, the easier to monitor and therefore the less moral hazard. Models like BBG (1994) relate monitoring to imposing penalties. Therefore, while it might be easier for a group member to monitor her relative partner in the group, it might be difficult to impose penalties on her as well.

We also attempt to measure the cost of monitoring by looking at the percentage of group members who have phone services. The hypothesis here is that the higher the percentage of members with phone services, the easier the flow of information and therefore monitoring. *Phone* measures the percentage of members in a group that have access to either land or cell phone services.

Group Pressure Variables

Besely and Coate (1995) stressed the importance of group pressure against defaulting members to reduce moral hazard in a borrowing group. A related argument by Wydick (1996) shows that once sufficiently strong and credible threats of social sanctions against a defaulting group member exist, group lending will be able to deter moral hazard. In the empirical analysis, a similar, but not identical structure used by Wydick (1999) is utilized to measure group pressure among group members. Group pressure *Pressure* is measured by utilizing five yes/no questions asked to group leaders: whether group members are willing to practice pressure against another group member late in repaying, whether the group feels that practicing such pressure is difficult, whether group members feel moral to repay group loan, whether group members repay to stay on good terms with each other, and whether the group has an internal code to punish a defaulting group member. *Pressure* is thus an index equal to the number of yes responses to these questions.

In Ahlin and Townsend (2005) modification of Stiglitz (1990), BBG (1994) and BC (1995) showed that these models contain predictions on the effect of cooperation on repayment rates. Cooperation in Stiglitz's model enables the group to jointly choose the type of project. This in turn circumvents free-riding of one member on his partner's safe behavior which improves repayment. In BBG model, group members who prefer safe behavior in non-cooperative groups will be willing to exert cheap penalties on other members who prefer risky behavior while cooperative groups will not be willing to do so. Cooperation in BBG model therefore reduces repayment. As in BBG, BC model predicts that cooperation decreases repayment. When groups behave cooperatively, borrowers commit ex ante not to use penalties against borrower *i* if borrower *i's* cost of repaying exceeds borrower *j's* benefit from a non-delinquent *i*, and vice versa. When groups behave non-cooperatively, groups cannot commit not to impose penalties, and the borrower who realizes higher output will use penalties against a low output borrower to force repayment ex post even if the cost to the low output borrower is higher than the benefit to the high output borrower. In the empirical analysis, a similar, but not identical, structure by Ahlin and Townsend is utilized to measure cooperation among group members. Our measure of cooperation utilizes 6 yes/no questions asked to group leaders; whether cooperation to choose the place of business, referring customers to other group members, helping with free labor, helping with money, cooperation to purchase inputs, cooperation to sell output has occurred during the current cycle of lending. The index is the number of yes responses to these six questions. The same set of questions was asked twice regarding non-related and related group members respectively. *Coop1* therefore measures cooperation among non-relatives and *Coop2* measures cooperation among relatives within groups.

Social Ties Variables

Floro and Yotopolous (1991) showed that the success of group lending depends on its ability to harness social ties among borrowers to improve loan repayment. The importance of social

ties is explained in terms of the consequences of a group member default. Since default has a negative impact on other group members' returns and future access to loans, and since borrowers are sensitive to their existing social network, borrowers will lessen their moral hazard behavior. Consequently, social ties between group members improve the group repayment performance. Our measure of social ties *Socialties* utilizes 6 yes/no questions asked to group leaders; whether she can get any type of help from other group members if needed, whether she can count on other group members to take care of her child if she is in need to go away for awhile, whether she has visited group members in the past week, whether she has had phone conversations with other group members in the past week, whether she seeks help from other group members to make a decision, whether she seeks mediation from others to solve a dispute with other group members. *Socialties* thus is an index equal to the number of yes responses to these six questions.

2.5 Empirical Results

The following empirical analysis uses heteroscedastic probit and negative binomial models to estimate the effects of a number of independent variables on group repayment performance, *Delinquency* and *Delinquency Intensity*. Our main hypotheses to be tested are the effect of screening, monitoring, group pressure, and social ties on groups' repayment performance.

We start by estimating a base model that includes our measures of screening, monitoring, group pressure, social ties and other control variables including repayment history, loan size, outside credit availability, and education.

We then consequently add variables that may influence a group's repayment performance: a dummy variable to capture any difference in repayment behavior across the two branches surveyed, the mean size of land owned by the group, groups' religion intensity, and the number of years since a group took its first loan.

2.5.1 Probit Results

The following empirical analysis uses a heteroscedastic probit model to estimate the effects of a number of independent variables on group repayment performance, *Delinquency*. The model allows the error term to vary according to the general formulation analyzed by Harvey (1976),

$$Var(e_i) = \sigma_i^2 = \left(\exp\left(z'\gamma\right)\right)^2 \tag{2.1}$$

where z is a vector of variables that includes one or more of the independent variables and γ is a vector of coefficients. Denoting *delinquency* by $y = 1$ and no delinquency by $y = 0$, we model the probability of delinquency by a heteroscdastic probit model:

$$\Pr ob(y = 1) = \Phi\left(\frac{x'\beta}{\exp(z'\gamma)}\right)$$

$$\Pr ob(y = 0) = 1 - \Phi\left(\frac{x'\beta}{\exp(z'\gamma)}\right) \tag{2.2}$$

where Φ is the normal distribution function, x is a vector of independent variables, and β is a vector of parameters. Maximum likelihood estimation of β and γ allows us to perform a likelihood ratio test for the hypothesis that $\gamma = 0$, a condition that corresponds to homoscedastic errors.[11] Equation 2 is estimated with z defined to contain outside credit availability, *Croption*.

Heteroscedastic probit results are shown in Table 2.3. The likelihood ratio tests reported at the bottom of the table and the t-values of the null hypothesis that $\gamma = 0$ reject any model without heteroscedasticity.

Since the dependent variable involves late repayment at any time during the current loan cycle, then groups with longer history are more likely to have late repayment. From the baseline model, Model 1, the coefficient on *lnrephist,* the natural log of repayment history*,* is positive as

[11] For an application of this test, see Knapp and Seaks (1992).

expected and statistically significant. Groups with longer history of repayment have higher probability of late repayment. This probability increases at a decreasing rate as shown by the positive sign on the coefficient of *lnrephist*.

Table 2.3: Heteroscedastic Probit Regression Results

Variable	Model 1	Model2	Model3	Model4	Model5
Constant	-0.377 (-0.16)	-0.180 (-0.08)	-0.271 (-0.11)	-0.622 (-0.24)	-0.494 (-0.18)
Control					
Lnrephist	4.712 (4.42)***	5.112 (4.33)***	5.130 (4.22)***	5.207 (4.14)***	5.840 (3.92)***
Loansize	0.448 (1.68)*	0.446 (1.64)*	0.451 (1.65)*	0.446 (1.63)*	0.381 (1.31)
Loansizesq	-0.013 (-1.72)*	-0.013 (-1.66)*	-0.012 (-1.65)*	-0.012 (-1.63)*	-0.012 (-1.45)
Education	0.729 (1.23)	0.747 (1.22)	0.989 (1.42)	0.982 (1.40)	1.224 (1.67)*
Branch		-0.419 (-1.15)	-0.466 (-1.26)	-0.467 (-1.25)	-0.619 (-1.50)
Land			-0.028 (-0.90)	-0.026 (-0.85)	-0.035 (-1.00)
Religion				0.332 (0.36)	0.649 (0.65)
Groupage					0.135 (1.71)*
Outside Credit					
Croption	0.695 (0.89)	0.828 (0.96)	0.944 (1.05)	0.972 (1.05)	1.163 (1.05)
Screening					
Screen	-0.359 (-1.13)	-0.441 (-1.31)	-0.426 (-1.26)	-0.448 (-1.29)	-0.561 (-1.49)
Knowtype	-1.509 (-1.96)**	-1.405 (-1.81)*	-1.424 (-1.81)*	-1.429 (-1.81)*	-1.557 (-1.89)*
Monitoring					
Samebus	-0.661 (-0.79)	-0.589 (-0.69)	-0.580 (-0.68)	-0.607 (-0.70)	-0.517 (-0.58)
Relative	-3.724 (2.78)***	-3.934 (-2.84)***	-3.900 (-2.78)***	-3.909 (-2.79)***	-4.379 (-2.94)***
Cphone	-0.634 (-1.04)	-0.554 (-0.87)	-0.604 (-0.94)	-0.568 (-0.87)	-0.509 (-0.74)
Group Pressure					
Pressure	-0.439 (-2.32)***	-0.506 (-2.48)***	-0.480 (-2.35)***	-0.462 (-2.21)**	-0.546 (-2.46)***
Coop1	0.010 (0.07)	-0.002 (-0.02)	0.024 (0.16)	0.015 (0.10)	0.050 (0.31)
Coop2	0.655 (3.15)***	0.678 (3.15)***	0.686 (3.14)***	0.694 (3.16)***	0.771 (3.31)***
Social ties					
Socialites	-0.540 (-3.28)***	-0.558 (-3.25)***	-0.580 (-3.31)***	-0.581 (-3.32)***	-0.613 (-3.33)***
Log Likelihood	-71.0556	-70.3609	-69.9016	-69.8345	-68.2130
Lnsigma2					
Croption (γ)	1.247 (2.43)***	1.406 (2.61)***	1.433 (2.63)***	1.470 (2.60)***	1.731 (2.65)***
Likelihood-ratio test of lnsigma2=0					
Chi2(1)	8.09	9.46	9.80	9.94	11.96
p-value	0.0045	0.0021	0.0017	0.0016	0.0005

Notes: *Delinquency* = 1 if a group had at least one late repayment and zero if a group paid all installments on time. Numbers in Parentheses are t-values. Significance levels of 10, 5 and 1% are denoted by *, **, *** respectively.

The signs on the loan size in our model suggest an inverted U relationship of delinquency with loan size.[12] Statistically, the coefficients on *loansize* and *loansizesq* are significant at 10% level.[13] Our empirical results on loan size go in line with Sharma and Zeller (1996) finding but are contrary to what was found in Ahlin and Townsend (2005) and Godquin (2002).[14]

In the Stiglitz (1990) model and in the Ahlin and Townsend extended model of BBG(1994), risky projects become relatively more attractive as loan size increases which enforces unwilling delinquency to increase. While our results show evidence of this effect, they also show that a further increase in loan size reduces delinquency. A further increase in loan size of a group will also increase that group's joint liability in case of default. Group members will therefore have more incentive to monitor each other and apply more group pressure on those members who show bad signs of repayment behavior. More monitoring and group pressure are expected to improve the repayment behavior of the individual group members.

In Model 5, after controlling for branch, land, religion, and group age, *Loansize* and *Loansizesq* become statistically insignificant.

Projects returns and therefore repayment are expected to be positively influenced by the productivity of the group. Our measure of Productivity, *Education*, is a dummy variable that is equal

[12] Recall that our repayment measure is a dummy = 1 if a group had at least one late repayment and zero otherwise.

[13] *Loansize* can be endogenous. Lenders usually increase loan size over time to those groups with good past performance. We tested all models for endogeneity using the Smith-Blundell (1986) method using the percentage of new members in a group as an instrumental variable for the loan size. Endogeneity of the loans size was rejected in all models. The exogeneity of the loan size is not surprising given the dynamic incentives followed by the MFW and the structure of the borrowing groups. Group members are allowed to switch to their preferred groups at the beginning of each loan cycle and new borrowers may join old groups. New members start with small loan size of JD 200 and can go up to JD 500 over time. Therefore, old good performing groups may not be associated with total larger group loans if there are new members joining these groups. For example, a group of four in their, say, fifth loan cycle, may have a total loan size of JD 2000, 500 each. If, at the beginning of their sixth cycle, one member of this group switches to another group and a new member joins this group, then the total loan size of this group would be JD 1700, 500 for each old member and 200 for the new member.

[14] The instrumented size of the loan in Godquin paper presented a positive impact on repayment that is contrary to what was found before instrumentation.

to 1 if a group has an average educational attainment of 4 or above. Surprisingly, *Education* is insignificant in all models but the last one. In Model 5, after controlling for branch, land, religion, and group age, *Education* still unexpectedly positive. That is, groups with high level of education have higher probability of late repayment relative to those of low education.[15] The empirical literature on the effect of education on repayment found mixed results. Ahlin and Townsend (2005) found that more productive groups, in terms of education, have better repayment performance. Zeller (1998) using literacy as a measure of human capital found that the coefficient on literacy is not statistically different from zero. Godquin (2002) found that education worsens repayment in the whole sample but has no effect on the split samples.

An explanation of this may lie on the fact that the highly educated groups are less credit rationed. The MFW typically begins by lending groups small amounts and then increasing loan size for these groups with satisfactory repayment. If a group faces a high degree of credit rationing it implies that this group has unfulfilled credit demand. In the survey, almost 96% of the group leaders expressed their willingness to borrow larger loans at the current interest rate. In order to protect future larger loans, groups with higher unfulfilled credit demand will be expected to increase their efforts to improve repayment performance. In the survey, we asked the group leaders about their desired loan sizes. We also have the group leaders' actual loan sizes from the MFW's data base. These data allows us to measure the degree of credit rationing of the group leaders by taking the difference between the desired loan sizes and the actual ones expressed as a percent of the desired loan sizes. Assuming that the group leader and his partners are identically credit rationed, we found a negative and significant correlation between *Education* and credit rationing of -0.19 at the 1% level. That is, highly educated groups are associated with lower degree of credit rationing. Since these

[15] Different measures of productivity like the mean and median of groups' educational attainment yielded similar results.

groups face lower unfulfilled credit demand and less concerned about future larger loans, they are expected to exert less effort to improve their repayment performance.

Both Stiglitz (1991) and BBG (1994) have predictions on the effect of outside borrowing options on repayment rates; groups with more outside borrowing options will experience higher loan size giving group members greater incentive for risky projects. The sign on *Croption* is as expected by theory but statistically insignificant under all specifications.

The practice of screening is expected to crowd in safer type of borrowers which should improve repayment. The signs on the screening variables are negative as expected; screening reduces delinquency. While *Screen* has the expected sign in all models, it is not a significant predictor of late repayment. In adverse selection models and as a prerequisite for screening to take place, borrowers were assumed to know each other type. In all models, the sign on *Knowtype* is negative as expected and statistically significant. Borrowers' knowledge about the quality and sales of each other occupations improves their group repayment performance. Similar results of the positive effect of screening on good repayment are also documented in Wenner (1995) and Sharma and Zeller (1996).

With group lending, individual borrowers are liable for themselves and for others in their group, therefore, they have incentives to monitor each others' actions. The signs of the coefficients on cost of monitoring measures are all negative as expected. More monitoring mitigates moral hazard and leads to lower delinquency. However, occupational homogeneity, *samebus*, and the percentage of group members with access to phone services, *Phone*, are not significant predictors of delinquency in all probit models. A similar measure of occupational homogeneity used by Ahlin and Townsed (2005) was also found to be a poor predictor of repayment.[16] *Relative* measures the percentage of members in the group that are related to each other. The sign on the coefficient of *Relative* is negative and statistically significant under all specifications. Since the ease of information

[16] Occupational homogeneity in Ahlin and Townsend was used as a measure of output correlation. The authors indicate that this measure can be used as a monitoring proxy.

flow, and therefore monitoring, is expected to be better among relatives, there would be less moral hazard and consequently lower delinquency. Ahlin and Townsend (2005) and Sharma and Zeller (1996) used similar measures to *Relative*. In these papers, however, the percentage of relatives on a group worsens repayment performance. Both papers argue that it is difficult to impose penalties on relatives which weaken the repayment enforcement process. Contrary to these papers, our results suggest that any difficulty in imposing penalties on relatives is overcome by the greater ease of monitoring relatives' actions.

Exercising pressure and imposing penalties against defaulting members mitigate moral hazard while cooperation among group members may dilute the willingness to exercise pressure and the imposition of penalties which encourages moral hazard. The signs of the coefficients on all group pressure measures give an evidence of this statement. In all models, the sign on *Pressure* is negative and statistically significant indicating the importance of group pressure in alleviating moral hazard behavior of the borrowers. Similar results were found by Ahlin and Townsend (2005) and Wydick (1999). The signs on the cooperation measures are positive indicating that a greater degree of cooperation among group members increases the probability of delinquency. The signs and significance levels of cooperation measures are the same in all models. Cooperation among non-relatives, *Coop1*, does not seem to be a strong predictor of delinquency as it is statistically insignificant. Cooperation among relatives, *Coop2*, however, has a strong positive predictive power on delinquency.

The importance of social ties on repayment is explained in terms of the consequences of a group member's default. Since default has a negative impact on other group members' returns and future access to loans, and assuming that borrowers are sensitive to their existing social network, borrowers will lessen their moral hazard behavior. As expected, our measure of social ties, *Socialties,* shows a negative and strong impact on delinquency in all models. Our finding of the effect of

Socialties on repayment is contrary to Godquin (2002) results but in line with Zeller (1998). *Relative*, which can be viewed as a measure of social ties, goes in line with our finding that social ties reduces the probability of delinquency.

In Models 2 through 5, we add new variables that are usually included in the empirical and theoretical literature on the determinants of delinquency. In Model 2, we try to capture any difference in repayment behavior of group borrowers across the two branches surveyed. The sign on *Branch*, which is a dummy variable equals to one if a group belongs to Al-Rusaifa's branch, hold a negative sign in models 2 through 5. While the negative sign suggests that groups that belong to Al-Rusaifa's branch have lower probability of delinquency, such probability is statistically insignificant.

In Model 3, we include *Land*, the mean size of land owned by a group. The sign on *Land* is negative as expected. Assets ownership improves the capacity of the groups to meet repayment requirements on time. However, this effect is statistically insignificant in Models 3 through 5.

Next we include a measure of a cultural factor that may affect group repayment performance, *Religion*. In this model as well as in model 5, *Religion* is statistically insignificant.

In Model 5, we include the group age, *Groupage*, the number of years since the group took its first loan. The sign and the statistical significance of *Groupage* suggest that groups may envision their relationship with the lending institution as transitory and therefore exert lower effort to repay on time on later loan cycles. In this model, *loansize* and *loansizesq* have the same signs as in the previous model, but the inclusion of *Groupage* renders them insignificant.

2.5.2 Negative Binomial Results

The following empirical analysis uses Negative Binomial estimation to test the effects of a number of independent variables on group repayment performance, *Delinquency Intensity*. The negative binomial model derives from a Poisson distribution. The Poisson has been suggested as the

benchmark model for count data (Cameron and Trevedi 1998). In the Poisson model y_i has mean $\mu_i = \exp\left(x_i'\beta\right)$ and variance μ_i, equal dispersion. That is;

$$\mu_i = E\left(y_i \middle| \mathrm{x}_i\right) = \mathrm{var}\left(y_i \middle| \mathrm{x}_i\right) = \exp\left(\mathrm{x}_i'\beta\right) \tag{2.3}$$

However, the conditional variance in most applications is greater than the conditional mean. While such overdispersion does not affect the poisson regression model estimates being consistent, such estimates are inefficient. The standard errors of the poisson regression model will be biased downward which will over estimate the significance of the explanatory variables (Long 1997).

Overdispersion seems likely in our study because there are important explanatory variables that are difficult to capture (e.g., group members' income, group members' occupation risk level), and because error may exist in the estimates of some variables (pure randomness). *Delinquency Intensity* ranges in values between zero and 41. Approximately 85% of the sample takes values of 0, 1, 2, 3, or 4. The mean of the number of days of late repayment is 3.1 days with a variance of 40.26. The raw data are therefore overdispersed and the inclusion of the regressors did not eliminate this overdispersion in Poisson regression model indicating its inadequacy of fit. If overdispersion exists, a Poisson model is not appropriate and a negative binomial model can be used instead.

A negative binomial regression model includes a random error term ε_i representing the effect of omitted explanatory variables or pure randomness. Therefore, equation 3 can be written as:

$$\tilde{\mu}_i = \exp\left(\mathrm{x}_i'\beta + \varepsilon_i\right) = \mu_i \exp\left(\varepsilon_i\right) \tag{2.4}$$

where $\exp\left(\varepsilon_i\right)$ is a gamma distributed random variable with mean one and variance α. The negative binomial probability distribution is a mixture of Poisson distribution that allows the Poisson mean to be gamma distributed. The negative binomial distribution is given by:

$$\Pr\left(y_i \left| \mathrm{x}_i \right.\right) = \frac{\Gamma\left(y_i + \alpha^{-1}\right)}{y_i \Gamma\left(\alpha^{-1}\right)} \left(\frac{\alpha^{-1}}{\alpha^{-1} + \mu_i}\right)^{\alpha^{-1}} \left(\frac{\mu_i}{\alpha^{-1} + \mu_i}\right)^{y_i}, \alpha > 0 \tag{2.5}$$

where Γ is the gamma function. Equation 5 has a mean μ_i and variance

$$\mathrm{var}\left(y_i \left| \mathrm{x}_i \right.\right) = \mu_i + \alpha \mu_i^2 \tag{2.6}$$

where α, the variance of the gamma-distributed error, is the overdispersion parameter. If $\alpha = 0$, the negative binomial reduces to the Poisson distribution. The appropriateness of applying the Poisson model versus the negative binomial model can be assessed based on the statistical significance of estimate value of α.

We run similar models to those in Table 2.3. Models 6 through 10 correspond to Models 1 through 5 in Table 2.3 but with a different dependent variable. The dependent variable in the following analysis is the number of days late of repayment. Using the heteroscedasticity-robust standard errors, the negative binomial results are shown in Table 2.4.

Table 2.4 shows that there is a strong evidence of overdispersion. The dispersion parameter is positive and significant at the 1% level in all models. Alternatively, the computed likelihood ratio tests of overdispersion are even more highly significant.

Similar to the probit estimations, the negative binomial estimations show that the coefficient on *lnrephist* is positive and statistically significant. That is, the longer the history of repayment, the more days of late repayments.

The signs on the loan size in our model suggest an inverted U relationship of delinquency with loan size. Statistically, the coefficients on *loansize* and *loansizesq* are significant at 1% level in all models. Due to possible endogeniety in loan size in the negative binomial model, we give no interpretation on the effect of loan size on the number of days of late repayment.[17]

[17] Testing for endogeniety in negative binomial model is to be done later.

Table 2.4: Negative Binomial Results

Variable	Model 6	Model7	Model8	Model9	Model10
Constant	-4.517 (-2.34)***	-4.395 (-2.49)***	-3.950 (-2.37)***	-2.874 (-1.74)*	-3.070 (-1.81)*
Control					
Lnrephist	4.754 (6.45)***	4.876 (6.52)***	4.923 (6.30)***	4.775 (6.17)***	4.720 (6.39)***
Loansize	0.782 (3.51)***	0.795 (3.63)***	0.759 (3.66)***	0.707 (3.47)***	0.741 (3.51)***
Loansizesq	-0.0254 (-3.89)***	-0.025 (-4.02)***	-0.024 (-4.06)***	-0.022 (-3.83)***	-0.023 (-3.91)***
Education	0.642 (1.93)**	0.557 (1.68)*	0.815 (2.46)***	0.856 (2.63)***	-0.703 (2.77)***
Branch		-0.509 (-1.73)*	-0.606 (-1.95)**	-0.668 (-2.16)**	-0.703 (-2.30)**
Land			-0.022 (-1.79)*	-0.022 (-1.91)**	-0.024 (-2.12)**
Religion				-0.871 (-2.31)**	-0.827 (-2.15)**
Groupage					0.064 (1.36)
Outside Credit					
Croption	0.644 (1.97)**	0.827 (2.35)***	0.912 (2.58)***	0.823 (2.34)***	0.760 (2.13)**
Screening					
Screen	-0.003 (-0.02)	-0.079 (-0.33)	-0.055 (-0.23)	-0.028 (-0.12)	-0.015 (-0.07)
Knowtype	-1.103 (-1.59)	-1.093 (-1.56)	-1.256 (-1.77)*	-1.144 (-1.61)*	-1.159 (-1.77)*
Monitoring					
Samebus	-0.046 (-0.08)	-0.052 (-0.09)	0.054 (0.09)	0.097 (0.17)	0.093 (0.16)
Relative	-2.015 (-2.45)***	-1.813 (-2.25)**	-1.647 (-1.98)**	-1.637 (-2.21)**	-1.710 (-2.23)**
Cphone	-0.359 (-0.80)	-0.373 (-0.82)	-0.420 (-0.93)	-0.523 (-1.18)	-0.472 (-1.12)
Group Pressure					
Pressure	-0.358 (-2.78)***	-0.440 (-3.51)***	-0.483 (-3.74)***	-0.477 (-3.73)***	-0.513 (-3.89)***
Coop1	0.176 (1.83)*	0.174 (1.84)*	0.222 (2.22)**	0.219 (2.09)**	0.223 (2.16)**
Coop2	0.297 (2.38)***	0.255 (2.04)**	0.260 (2.06)**	0.223 (1.95)**	0.243 (2.06)**
Social ties					
Socialites	-0.437 (-3.92)***	-0.408 (-3.76)***	-0.418 (-4.00)***	-0.389 (-3.65)***	-0.411 (-3.64)***
Log Likelihood	-277.5303	-2.75.7614	-2.74.7269	-2.73.4404	-2.72.5573
α	1.255 (5.22)***	1.216 (5.55)***	1.198 (5.57)***	1.125 (5.02)***	1.102 (4.96)***
Likelihood-ratio test of $\alpha = 0$					
Chibar2(1)	251.98	253.11	255.12	199.20	198.58
p-value	0.000	0.000	0.000	0.000	0.000

Notes: *Delinquency Intensity*: The number of late days of repayment. Numbers in Parentheses are t-values. Significance levels of 10, 5 and 1% are denoted by *, **, *** respectively.

Under all models' specifications, *Education* has an unexpected sing. That is, groups with higher level of education have more days of late repayment. As mentioned previously, highly educated group face lower credit constraints and are less concerned about future larger loans which give them less motivation to improve their repayment performance. The negative effect of education on good repayment has not been documented before. Ahlin and Townsend (2005) found that more productive groups, in terms of education, have better repayment performance. Zeller (1998) using

literacy as a measure of human capital found that the coefficient on literacy is not statistically different from zero.

While the availability of outside borrowing options, *Croptions*, performs poorly in probit models, it gains predictive power in the negative binomial models with the positive expected sign. Groups with more outside borrowing opportunities experience higher loan size giving group members greater incentives for riskier projects and consequently more days of late repayment. One may also argue that groups with more alternative credit sources may value the MFW's services less which leads to more days of late repayment (Wenner (1995)).

The signs on the screening variables are negative as expected but lose predictive power in models 6 and 7. In models 8 through 10, and after the consequent inclusion of land, religion, and group age, *Knowtype* turns significant at standard significance levels while *Screen* remains insignificant. Borrowers' knowledge about the quality and sales of each others' occupations seems to matter in reducing the number of days of late repayment.

The performance of monitoring measures changes in the negative binomial models compared to the probit models. The sign on *Samebus* holds an unexpected sign in models 8 through 10 but it is statistically insignificant, the performance of *Relative* is comparable to those in probit models, *Phone* has the expected sign but has no predictive power. Having more relatives in a group eases the process of monitoring and reduces the number of late repayment days.

All the group pressure measures have the expected signs and have significant explanatory power on the number of days of late repayment in all the negative binomial models. The results show that a greater degree of *Pressure* among group members reduces the number of days of later repayment. Cooperation among relatives and non-relatives increases the number of days of late repayment. Cooperation among group members seems to dilute the willingness to exercise pressure on delinquent members which encourages late repayment. Cooperation among non-relatives enters

with the same sign but significantly in the negative binomial models compare to those in probit models.

Ahlin and Townsend (2005) found that cooperation among non-relatives affects repayment worsens. Our results show that cooperation, whether it is among relatives or non-relatives, worsens repayment.

Similar to probit models, *Socialties* shows a negative and significant impact on delinquency intensity in all the negative binomial models. The effect of *Relative* on repayment goes in line with the effect of *Socialties*. Group members' sensitivity to their social network lessens their moral hazard behavior and consequently improves their repayment performance.

In Models 7 through 10 we add the rest of the control variables; namely, *Branch*, *Land*, *Religion*, and *Groupage* respectively.

In models 7 through 10, the sign on *Branch*, which is a dummy variable equal to one if a group belongs to Al-Rusaifa's branch, hold a negative sign. Unlike the probit models, *Branch* in the negative binomial models is statistically significant. The negative sign suggests that groups that belong to Al-Rusaifa's branch have fewer days of late repayment.

Next we include *Land*, the mean size of land owned by a group. The sign on *Land* is negative as expected and statistically significant in models 8 through 10. Assets ownership improves the capacity of the groups and reduces the number of days of late repayment.

While the cultural factor in probit model, *Religion*, holds a positive sign with negligible predictive power, it holds a negative sign and is statistically significant in the negative binomial models. *Religion* seems to not affect the occurrence of late repayment, but once a late repayment occurs, more religious groups repay faster.

In Model 10, we include the group age, *Groupage*. While the sign on *Groupage* is still positive as in probit model, it loses its predictive power. Other results are robust to the inclusion of *Groupage*.

2.6 Conclusion

This paper empirically tests the theoretical predictions about repayment performance in group lending programs. We use data from a survey of 160 MFW borrowing groups to test the significance of screening, monitoring, group pressure, and social ties on borrowing group behavior in terms of repayment performance. Our results are consistent with the vast majority of the theoretical group lending models.

Though not overwhelmingly manifested, the results show that screening plays a role in reducing delinquency. Group members that have better knowledge about each other occupation quality tend to reduce delinquency.

Our unmatched rich data on group pressure reveals its significance impact in reducing delinquency. All group pressure variables hold the expected signs and two out of three variables show negative impact on delinquency in all models. With the exception of Ahlin and Townsend (2005), this result has not been documented in the previous empirical literature.

Next the percentage of relatives in a group showed a significant negative impact on delinquency. In contrast, the previous empirical literature found that relatives have a negative impact on repayment. Relatives may allow for better communication but may be harder to impose sanctions against. Our results support the hypothesis that more relatives in a group ease the process of monitoring and this reduces moral hazard.

The analysis shows that groups with higher level of social ties have a lower delinquency. This is one of the central findings of this paper. What enhances this result is the negative effect of the percentage of relatives in a group on delinquency, given that such a measure can also be used as an indicator of social ties. Except for Zeller (1998), this result is consistent with theory but contrary to the previous empirical literature.

We also found that loan and socio-economics characteristics have to be taken into consideration for an effective understanding of the determinants of the groups' repayment behavior. The loan size showed a non-linear effect on delinquency. While increasing loan size deepens delinquency, a further increase dampens it. Surprisingly, we find that education has a positive effect on delinquency. Another interesting finding is the fact that the access to more outside credit and group age increase delinquency while asset ownership seems to enhance the groups' ability to repay on time. We find that religious beliefs affect the intensity of delinquency, with more religious borrowers repaying quicker in case of delinquency.

The conclusion of this chapter suggests that the performance of group lending as an institution is more likely to be more successful if group members screen and monitor each other, impose greater social pressure and have strong social ties.

Chapter 3

The Role of the Group Leader in Group Lending Schemes: Evidence from Jordan

3.1 Introduction

The inability of the poor to meet the collateral requirements stipulated by banks and the inherently high cost to banks to screen and monitor the actions of the poor and to enforce loan contracts may all contribute to the exclusion of the poor from the credit market. One innovation for extending credit to the poor lies in group lending – lending to a self-selected group of borrowers. While a loan is given to each individual in a group, the group members are jointly liable for the repayment of the loan. If a group defaults, all group members will be denied future access to credit. Stimulated by joint liability and the threat of denial to future access to credit, group lending creates incentives for individual group members to screen out risky borrowers, monitor each others' actions and enforce repayment. As such, group lending transfers the cost of screening, monitoring and contracts enforcement from lenders to borrowers. Usually, borrowers have more information about each other and hence can solve the asymmetric information problem that plagues lenders from extending credit.

Theoretical models generally find that group lending with joint liability improves repayment performance through the use of a more effective mechanism of screening, monitoring, contract enforcement, and social ties among group members. Many empirical studies are in support of these theoretical models. However, the theoretical work assumes that all group members engage in screening, monitoring and enforcement activities and use their social ties to ensure repayment. In this paper we empirically investigate whether the effectiveness of joint liability, screening and monitoring activities and the use of social ties effects on repayment performance differ across different group members. In particular, we analyze whether the provision of these activities and their

effect on repayment performance differ between the group leaders and the rest of the group members.

The data used in the empirical analysis was obtained by the researcher himself through a survey of 160 groups carried out in cooperation with the Microfund for Women (MFW), a group lending institution in Jordan. The data drawn from the survey allows us to test whether there are any differences in the effects of screening and monitoring activities, the social ties and the joint liability payment of the group leader and the rest of the group members on the repayment performance of the group.

The rest of this paper is organized as follows. Section 3.2 reviews briefly on the theoretical literature and lays out the motivation of this paper. Section 3.3 describes the role of the group leader at the MFW. Section 3.4 reviews the relevant empirical literature. Section 3.5 describes the data collection process and section 3.6 provides a description of the variables. In section 3.7 the empirical results are presented and in section 3.8 the results are summarized and discussed. Finally, section 3.9 provides some concluding remarks.

3.2 Theory and Motivation

3.2.1 Theory

In group lending, credit is extended to the poor through a self-selected group of borrows who are jointly liable for a loan. While the loan is given to individuals, the individuals as a group are jointly liable for the loan repayment. Borrowers can exploit the inside information that they have about each other to from a relatively safer borrowing group. Group lending schemes induce group borrowers to engage in screening out risky borrowers through their knowledge about each other's capabilities, assets and character traits (Ghatak (1999), Van Tassel (1999)). Because group borrowers are jointly liable for the loan, the likelihood of successful projects of the group members becomes a common interest of the group. Group lending induces members to monitor each other actions,

assess whether safe production techniques are being employed and to deter any divergence of funds all of which improve the likelihood of successful projects (Varian (1990), Stiglitz (1990), Banerjee, Besely, and Guinnane (1994)). In group lending, group borrowers will be denied future access to credit if the group defaults. Such a threat gives group members incentives to pressure and enforce defaulting members to abide with the loan repayment terms (Besely and Coate (1995), Aghion (1999)). Floro and Yotopolous (1991) showed that group lending capitalizes on the social ties among borrowers to improve loan repayment. Since default has a negative impact on other group members' returns and future access to loans, and if borrowers are sensitive to their existing social network, borrowers will reduce their moral hazard behavior.

Stiglitz (1990), Banerjee, Besley, and Guinnane (1994) and Ghatak (1999) have different conclusions on the effect of joint liability payment on the repayment behavior of borrowing groups. Stiglitz (1990) accounts for the fact that the joint liability payment functions as an additional tax on successful borrowers who choose safer projects. Since only successful borrowers who pay the joint liability payment, the payoff of safe projects is hurt more than the payoff of risky projects as the joint liability payment increases. This in turn diminishes the attractiveness of safe projects and worsens the repayment performance of a borrowing group. In Banerjee, Besley, and Guinnane (1994), an increased joint liability payment improves repayment performance. In that, an increase in joint liability payment raises the marginal benefit of monitoring and develops more intense group pressure. In Ghatak (1999), an increase in the joint liability payment worsens repayment. At a given interest rate, an increase in joint liability payment makes borrowers pay more on average. Higher joint liability payment lowers the payoff of borrowing relative to an outside option and safer potential borrowers are crowded out increasing the risky potential borrowers in the residual pool.

Theoretical models generally find that group lending improves repayment performance through its ability to mitigate asymmetric information, to generate a new mechanism of contract

enforcement in the credit market and to harness social ties among group members. Many empirical studies are in support of these theoretical models (Ahlin and Townsend (2005), Godquine (2002), Sharma and Zeller (1997), Wenner (1995), Wydick (1999), Zeller (1998)).

3.2.2 Motivation

The previous theoretical and empirical studies investigate the effect of screening, monitoring, enforcement activities and social ties on the repayment performance at the group level. In this, it is assumed that all group members engage in screening, monitoring and enforcement activities and the repayment performance of the group is a reflection of an equally collective effort of all members. In this paper we empirically investigate whether the effectiveness of the activities of screening and monitoring and the social ties effects on repayment performance differ across different group members. In this, we analyze whether the provision of these activities and their effect on repayment performance differ between the group leaders and the rest of the group members. The motivation of this paper arises from the nature of the role played by the group leaders in group lending schemes. A description of the role of the group leaders at the MFW and the motivation of this paper are discussed next.

3.3 The MFW and the Role of the Group Leader

The Group Guaranteed Lending Product (GGL) offered by MFW utilizes the group lending methodology, where individual borrowers themselves form a group that jointly guarantees the loan to the group. The group members must know each other and respect the loan size caps by cycle. There are also restrictions on who can form groups with whom. Within groups, members may not be business partners or from the same family. The required group size is between 4-6 members, and the group loans on average, range between JD200 and JD500 per borrower. The initial loan size for all new members is on average JD200. The groups have the choice to make their repayments either in bi-weekly or monthly installments. The MFW holds two basic meetings with the borrowing

groups, one to fill initial forms and discuss policies and the second to define group members' roles (leader and treasurer) and to review the loan contract orally. In the disbursement meeting at the MFW branch, clients are reminded of the contract policies.

The group leader is selected by the group members and functions as an intermediary between the group members and the loan officers. Being a group leader or treasurer is a voluntary activity and does not generate any financial privileges. The group leader supervises the group members and updates the loan officer with any developments related to group members such as change of projects, projects termination, change of address of residence or business, and any case of illness that may hinder a group member to abide with repayment. Along with the treasurer, the group leader collects the monthly payment installments from group members. If a group member refuses or fails to repay her monthly installment, the group leader can call the group members for a meeting to discuss and update the group members with the incident. In this meeting, the group leader arranges to collect the remaining balance of the defaulting member. The group leader has to report such an incident to the loan officer.

On the disbursement day, the loan officer gives the group leader and the treasurer one cheque equal to the total group loan. Then the group, as a whole, goes to a designated bank to covert it into cash. Only the leader and the treasurer can touch cheque and money, while others supervise. The leader and the treasurer, under the banker's eyes, do the loan sharing among group members. Installment repayment works in similar way: the group leader and the treasurer raise installments from each member, deposit the total amount in the MFW designated bank account and deliver the payment invoice to the MFW on the same day. The repayment installment process also occurs under other group member supervision.

In many group lending schemes including the MFW, groups are formed endogenously. After a group is formed, group members elect a group leader. Groups may then go through many loan

cycles. Any group member may exit at the end of each loan cycle and new members may join. A group leader functions as an intermediary between the group members and the lending program by supervising the group members and updating the loan officer with any repayment difficulties and any developments related to group members. The group leader's responsibility in supervising the rest of the group members and keeping the loan officer updated give them an advantage in obtaining information regarding the reputation, indebtedness and the wealth of the rest of the group members and their efforts employed in projects. The group leader's relative advantage in obtaining information about the rest of the group members places her in a relatively better position to screen borrowers and monitor their actions. The role of the group leader as a representative of the group to the lending program and her role in updating the loan officer of any repayment difficulties may intensify her incentives to enforce repayment, and to use her social ties with the rest of the group to improve repayment. It is this relative informational advantage of the group leaders that drives the suggestion that the activities of the group leaders may have different impacts on the repayment performance of the group compared to the impacts of the activities of the rest of the group members. Data from a survey of 160 borrowing groups from the MFW in Jordan allows us to shed light on the impact of the group leader on the group repayment performance relative to the impact of the rest of the group members.

3.4 Literature Review

To our best knowledge, Hermes, Lensink, and Mehrteab (2005) were the first and the sole authors to address the question of this paper. The authors used data from a questionnaire held in Eritrea among 102 borrowing groups to distinguish between the effects of monitoring and social ties of the group leader versus the other group members on the repayment performance of the group. The data the authors had did not allow them to analyze the differences in the impact of screening and enforcement behavior of the group leader versus the other group members on repayment. The

borrowing groups surveyed were from two group lending programs; the Saving and Micro Credit program (SMCP) and the Southern Zone Saving and Credit Scheme (SZSCS). Both programs function similarly. Groups in SMCP consist of 3-7 members and may not have family ties. Individuals in SMCP are allowed to borrow after accumulating a mandatory savings equal to 10 per cent of the loan size. Loan size ranges between USD70-USD710. Groups in SZSCS also consist of 3-7 members and individuals are allowed to borrow only after they accumulate a mandatory savings equal to 5 per cent of the loan size on new loans and up to 15 per cent on repeated loans. The loan size in SZSCS ranges between USD70-USD570.

Both programs operate in rural and urban areas. The groups in these programs are formed through self selections. After the group is selected, the group has to select a group leader and (sometimes) a group secretary. The group leader functions as an intermediary between the group members and the program staff. Leading a group is a voluntary activity that does not generate any financial privileges to the leader. The group leader has to keep the programs' staff updated with the performance and sustainability of the group. Moreover, the group leader has to chair group meetings, collect the payment installments from the group members and transfer them to the loan officer, visit group members, discuss business and group related problems, and call for extra meetings if repayment problems occur.

Hermes, Lensink, and Mehrteab build their hypothesis based on the description of tasks of the group leaders. That is, monitoring and enforcement activities within a group may differ between the group leader and other group members. The decision for the group leader to call for an extra group meeting is taken by the authors as an indication of extra monitoring and enforcement efforts by the group leader that may further enhance repayment. Also, the role of the group leader in collecting payment installments from group members and visiting and discussing business related problems with group members all add additional information to the group leader that facilitates his

mission in monitoring other group members. These additional channels of monitoring and enforcement are less explicitly available to other group members.

The sample used by Hermes, Lensink, and Mehrteab came from a survey of 102 groups, of which 56 were from SMPC and 46 from SZSCS. In the survey, the authors asked questions about the socio-economic characteristics of the group members and the saving and repayment performance of individual group members. The survey also includes questions about the group formation process, the existence of social ties, the process of screening, monitoring and enforcement within groups. From each group, the group leader and one or more group members were selected to answer the survey questions. One part of the questions was asked to both the group leader and other member(s) of each group; and the other part was asked to the group leader. The authors obtained information from 351 group members, of which 102 were group leaders. Out of 351 group members surveyed, 167 were from the SZSCS and 184 from SMCP.

The set up of the survey allows the authors to split the information for the independent variables into two separate variables, one related to the group leader and one related to the rest of the group members. Due to data problems, screening and enforcement measures were deleted from the regression analysis. The paper focuses only on the differences in monitoring and social ties activities of the group leader and the rest of the group and their impact on repayment. In each regression analysis, eight group leader specific variables, eight group members - excluding group leaders - specific variables presented in averages, and two group level variables are used as independent variables. The group leader specific variables include two measures of monitoring variables, two measures of social ties variables, and four control variables. The two measures of monitoring are the average distance in meters of homestead or business location of the group leader from the other members of the group and a dummy variable equal to one if the group leader regularly visits the other members of his group. The social ties measures include a dummy variable

equal to one if the group leader knew the other group members before the formation of the group and the length of time the group leader has lived in the interview area. The control variables are the age of the group leader, the monthly installment of the group leader as a percentage of his monthly income, the value the group leader attaches to having access to loans from the lending program in the future, and the educational background of the group leader. The same measures used for the group leader are used for the rest of the group members and are presented in averages. The group level variables include a dummy equal to one if the group has rules and regulations on how to run the group and the number of members in the group.

Three different dependent variables were used all of which are dummies. The first dependent variable takes a value of one if at least one member of a group indicated that he has had repayment problems in the current loan cycle (ARREAR1). The second dependent variable takes a value of one if at least one member of a group other than the group leader indicated that he has had repayment problems in the current loan cycle (ARREARS2). And the last dependent variable takes a value of one if the group leader indicated that he has had repayment problems in the current loan cycle (ARREARS3).

Using logit estimation, the empirical results show that both ARREARS1 and ARREARS2 are reduced if the group leader knew the group members before forming the group, a measure of social ties, and if the group leader assigns more value to future access to loans from the programs. From all the variables related to group members other than the group leader, the installment payment of group members as a percentage of income is the only significant factor that increases both ARREARS1 and ARREARS2.[18] When using the third repayment measure ARREARS3

[18] In the first regression of ARREARS2 (repayment problems of group members other than group leader), the length of time the group leader has lived in the interview area, an indication of social ties, significantly increases ARREARS2. The authors conclude that this social ties measure holds the wrong sign and therefore was dropped in the subsequent regression analysis. This wrong sign, however, can be an indication that group members with good social ties may face

(repayment problems of group leader), the social ties and monitoring variables related group leader and those related to the rest of the group members become insignificant factors in determining the repayment performance of the group leader. The results show that the age of the group leader and his monthly installment as a percentage of his income increases his repayment problems. The results also show that the higher the value a group leader assigns to future access to loans from the lending program the lower his repayment problems.

Hermes, Lensink, and Mehrteab concluded that the social ties of the group leader with the rest of the group improve the repayment performance of the group, whereas the social ties among the rest of the group members has no impact on the repayment performance of the group. They find all monitoring measures, either of the group leader or the other group members, are insignificant determinants of repayment performance.

3.5 The Data

During the months of February through May of 2005 I carried out a survey of 160 randomly selected borrowing groups of the MFW in Jordan. Two of the MFIs in Jordan provide group loans, the MFW and the Jordanian Micro Credit Company (JMCC). The MFW started its group lending program in 1996 while the JMCC started in 2004. The sample focuses only on the MFW group borrowers because the JMCC group lending program was newly introduced with the vast majority of the group borrowers having short history of repayment. The survey covered two provinces, Irbid (north) and Al-Rusaifa (mid-north). The reasons for choosing these two provinces are due to their geographical proximity to my place of residence and to the fixed budget and time I had. In Irbid, 84 groups were surveyed while in Al-Rusaifa the survey covered 76 groups. The survey took place at the MFW branch offices of Irbid and Al-Rusaifa. The MFW appoints a leader for each group who

difficulties in pressurizing a member with repayment problems, which dilutes the enforcement process. See Wenner (1995), Godquin (2002) and Ahlin and Townsend (2005).

functions as an intermediary between the group members and the MFW loan officers. The official leaders of the groups were interviewed as they walked into these branches for loan transactions related matters. Sitting at the MFW branch office and waiting for any group leader to show up guarantees that each possible group leader has the same probability of being selected in the sample. Three group leaders out of 163 refused to provide answers to the questionnaire.

Data on the loan size, the interest rate, the group size, and the number of continuing, old, and new members of each group, and the loan application dates were obtained from the MFW's data base. Also obtained from the MFW's data base are the number of installments, the amount of installments due, the due dates of repayment, the actual repayment amounts, and the repayment dates for each group.

In the survey, we asked questions about the socio-economic characteristics of the group leader as well as other group members. We also included questions on the process of screening, monitoring, enforcement and the existence of social ties within groups. In addition to the socio-economic characteristics, questions in the survey distinguish between the screening and monitoring activities of the group leader versus the screening and monitoring activities of the rest of the group members. Also, the survey included questions on the existence of social ties of the group leader with the rest of the group and the existence of social ties among the rest of the group members.

The data drawn from the survey allow us to test whether group leaders have any role to play in the repayment performance of their groups. Specifically, we investigate whether the group leader's activities of screening and monitoring and her social ties with the rest of the group members have any consequences on the repayment behavior of the group. We also investigate whether the joint liability payment of the group leader has any consequences for the repayment performance of the group. In doing so, we compare the role of the group leader with the role of other group members in mitigating adverse selection and alleviating moral hazard behavior. That is, we compare the effects

of screening and monitoring activities, social ties and the joint liability payment of the group leader to those of the rest of the group members on repayment.

While the effect of group pressure and enforcement can be an important factor in affecting the group repayment behavior (Besely and Coate (1995), Aghion (1999)), the data obtained does not allow us to separate the effects of pressure and enforcement exercised by the group leader versus the effects of pressure and enforcement exercised by the rest of the group members. This is why this paper focuses only on the differences of the effects of screening and monitoring activities, the social ties and the joint liability payment of the group leader and the rest of the group members on the repayment performance.

3.6 Variables Description

3.6.1 Dependent Variable

The dependent variable uses repayment data obtained from the MFW data base. This data includes the number of installments, the amount of installments due, the due dates of repayment, the actual repayment amounts, and the actual repayment dates for each group. Our measure of repayment is the sum of late days of repayment for each group up until the survey took place. We call this measure *Delinquency Intensity*. On average, groups have 3 days of late repayment with a minimum of zero days and a maximum of 41 days.

3.6.2 Independent Variables

The independent and the dependent variables used are summarized in Tables 3.1. *Delinquency Intensity* is the repayment measure discussed above. In Table 3.1 and thereafter, variables related to group leaders are preceded by the letter L while variables related to the rest of the group members are preceded by letter G.

Table 3.1: Variables Descriptive Statistics

Variable	Description	Mean	St. Dev
Dependent Variable			
Delinquency Intensity	Number of days of late repayment	3.1062	6.345
Control Variables			
Rephist	Repayment history during the current loan cycle	5.9625	2.479
Branch	A dummy equal to one if the group belong to Al-Rusaifa branch	0.475	0.500
Personal Characteristics			
Age of the group leader		35.525	7.897
Average age of the rest of the group members		35.413	5.663
A dummy variable if the group leader is married		0.9125	0.283
The percentage of the rest of the group members that are married		0.9223	0.146
Number of children of the group leader		4.225	2.670
Average number of children of the rest of the group members		4.0668	1.691
A dummy variable if the group leader has a high school education or higher		0.525	0.500
A dummy variable if the rest of the group members have an average of high school education or higher		0.1562	0.364
A dummy variable of the group leader observes the five daily prayers		0.9625	0.190
The percentage of the rest of the group members that observe the five daily prayers		0.8428	0.261
Joint Liability Variables			
LJointLiab	Group leader joint liability	0.7489	0.050
GJlintLiab	Rest of group joint liability	0.7656	0.033
Screening Variables			
LScreen1	A dummy variable equal to one if the group leader knows the quality of other group members' occupations	0.9437	0.231
GScreen1	A dummy variable equal to one if the rest of the group members know the quality of each other's occupations	.9500	0.218
LScreen2	An index of screening that ranges between 1 and 3	2.075	1.037
GScreen2	An index of screening that ranges between 1 and 3	2.1625	1.092
Monitoring Variables			
Lphone	A dummy variable equal to one if the group leader has a cell phone or land phone	0.825	0.381
Gphone	A dummy variable equal to one if at least two group members other than the leader have phone connection, either cell or land phone	0.606	0.490
LSamebus	Percentage of other group members for which the leader shares the same type of occupation	0.1536	0.224
GSamebus	Percentage of the rest of the group that has the same occupation	0.2841	0.335
Social Ties Variables			
Lsocialties	An index of the leader's social ties with relatives	0.4837	0.893
Gsocialties	An index of social ties among the rest of the group members who are relatives	0.7976	1.590
LInception	A dummy variable equal to one if the group leader was in the group since its inception	0.9437	0.231
GInception	A dummy variable equal to one if at least two members of the rest of the group were in the group since its inception	0.8250	0.381

Control Variables

Rephist is the number of installments made or supposed to be made since the loan was issued. It reflects the repayment history for each group in the current loan cycle. If repayment occurs with some probability *p* each month, then groups with a longer history are more likely to have late repayment. Toward the end of the cycle, however, groups are expected to improve their repayment performance to be eligible for another loan cycle. Therefore, the effect of repayment history is non-linear. The log of repayment history (*lnRephist*) will be considered in the empirical analysis.

The second control variable we use is a dummy variable equal one if a group belongs to the Al-Rusaifa branch and zero if a group belongs to the Irbid branch. We call this variable *Branch* and it captures any difference in repayment performance of groups that belong to the Al-Rusaifa's branch versus the repayment performance of groups that belong to the Irbid's branch. Both *Rephist* and *Branch* refer to the group as a whole.

Many personal characteristic variables have been used but not shown in the analysis. These include the age of the group leader versus the average age of the rest of the group members, the marital status of the group leader versus the marital status of the rest of the group members, the number of children of the group leader versus the average number of children of the rest of the group members, the education level of the group leader versus the education level of the rest of the group members, and the religion intensity of the group leader versus the religion intensity of the rest of the group members. The description and the summary statistics of these variables are shown in Table 3.1. On average, the group leader is 35.52 years old and the average age of the rest of the group members is 35.41. The marital status and the number of children of the group leaders are similar to those of the rest of the group members. The percentage of group leaders who are married is 91 and it is 92 for the rest of the group members. The group leader has on average 4.22 children and the average number of children of the rest of the group members is 4.06. The summary statistics

shows that the group leader is more educated and observes the five daily prayers more than the rest of the group members. Approximately 53 percent of the group leaders have high school education or higher while only 16 percent of the groups other than the group leaders have a high school education or higher. Group leaders on average have 10 years of education while the rest of the group members have 8 years. The percentage of the group leaders who pray five times a day is 95 while it is 84 for the rest of the group members.

We omit these personal characteristic variables because of the high correlation among some of them and because of the insignificant impact they have on the dependent variable. The results reported below are robust to the inclusion and exclusion of these control variables.

Joint Liability Variables

Stiglitz (1990), Banerjee, Besley, and Guinnane (1994) and Ghatak (1999) have different conclusions on the effect of joint liability payment on the repayment behavior of borrowing groups. While Stiglitz (1990) and Ghatak (1999) predict that the joint liability payment worsens repayment, Banerjee, Besley, and Guinnane (1994) predict that an increased joint liability payment improves repayment.

In Stiglitz (1990), the joint liability payment affects the choice of safe versus risky projects. Since only successful borrowers pay the joint liability payment, an increase in the joint liability payment hurts the payoff of safe projects more than the payoff of risky projects. The attractiveness of safe projects therefore diminishes and the repayment performance of a borrowing group worsens. In Ghatak (1999), at a given interest rate, higher joint liability payment makes safe borrowers pay more on average which crowds out safer potential borrowers and increases risky potential borrowers in the residual pool. According to Banerjee, Besley, and Guinnane (1994), an increased joint liability payment raises the marginal of monitoring and develops more intense group pressure.

Data on the group loan sizes are obtained from the MFW data base. Our strategy to measure the degree of joint liability exploits the information on group loan sizes and the share of the group leaders from these loans.[19] Our measure for the group leader joint liability payment, *LJLiab* is the percentage of the total group loan that the group leader has to pay to the MFW if the rest of the group members default.[20] The measure for the rest of the group joint liability payment is the percentage of the total group loan that a member of the rest of the group, on average, has to pay if the rest of the group , including the group leader, default.[21] We call this variable *GJLiab*. We believe that *LJointLiab* and *GJointLiab* are more direct and accurate proxies for the joint liability payment than proxies used in the literature.

Screening Variables

Ghatak (1999), Van Tassel (1999) and Ghatak and Guinnane (1999) presented models where group lending, via screening, can mitigate problems created by adverse selection. The key is that group formation displays positive assortative matching under group lending schemes. A successful safe borrower is more likely to pay the joint liability payment if he teams with a risky borrower but less likely to pay the joint liability payment if he teams with a safe borrower. Therefore, any safe borrower prefers to team with another safe borrower to form a group. In these models, and as a necessary prerequisite for screening to function, borrowers are assumed to be equipped with knowledge about each other's type of risk, capabilities and assets.

We use two measures for screening. The first is a dummy variable, *LScreen1*, equal to 1 if the group leader knows the quality and sales of other group members' occupations and *GScreen1* is a

[19] The information on the group loan sizes were obtained from the MFW data base while the information on the group leader loan sizes were obtained from the survey.

[20] The group leader joint liability payment is measured as (1 - (group leader loan size/total group loan size)).

[21] The rest of the group joint liability payment is measured as (1-(average loan size of a member of the rest of the group/total group loan size))

dummy variable equal 1 if the rest of the group members know the quality and sales of each others' occupations.

The second proxy for screening attempts to measure the knowledge of group members about each other's assets and debts. *LScreen2* utilizes 4 yes/no questions asked to the group leader: whether the group leader is aware of the debt other group members have with the MFW, the debt and savings other group members have with banks other than the MFW, debt that other members have with individuals outside the group, and assets that members have. *LScreen2* is an index equal to the number of yes responses to these questions. The same set of questions was asked to the group leader about other members. That is, whether the rest of the group members are aware of each others' debt with the MFW, each others' debt and savings with banks other than the MFW, each others' debt with individuals outside the group, and each others' assets. The yes responses to these questions compose G*Screen2*.

Monitoring Variables

Armendariz and Beatriz (1999), Ghatak and Guinnane (1999) and Banerjee, Besley, and Guinnane (1994) presented models in which peer monitoring mitigates moral hazard behavior of individual group members. Stiglitz (1990), another peer monitoring model, deduces that the repayment performance in group lending programs is positively related to the members' homogeneity with respect to their projects' riskiness. Cost of monitoring is measured using different proxies.

LSamebus is a proxy for occupational homogeneity. It is the percentage of the rest of the group members for which the leader shares the same type of occupation. *GSamebus* is the percentage of the rest of the group members that have the same occupation. The more homogeneous the group is in term of occupation, the easier to monitor.

We attempt to measure the cost of monitoring by looking at the access of group members to phone services. The hypothesis is that the higher the access to phone services of group members, the easier to monitor. The survey data contains information on the access of group members to both land and cell phone services. *Lphone* is a dummy variable equal to 1 if the group leader has a land or cell phone and *Gphone* is a dummy variable equal to 1 if at least two of the rest of the group members have land or cell phone.

The monitoring variables reflect the extent to which group members can acquire information about each other putting them in a better monitoring position. We expect a negative sign on the coefficients of *LSamebus, GSamebus, Lphone, and Gphone***:** if group members have the same occupation and have phone communication then the flow of information would be easier and they will be better equipped to monitor each other actions.

Social Ties Variables

Floro and Yotopolous (1991) showed that the success of group lending depends on its ability to harness social ties among borrows to improve loan repayment. The importance of social ties is explained in terms of the consequences of a group member default. Since default has a negative impact on other group members' returns and future access to loans, and since borrowers are sensitive to their existing social network, borrowers will lessen their moral hazard behavior. Consequently, social ties between group members improve group repayment performance.

The first proxy of social ties considers the social ties of the group leader with his relatives in a group. In this, we consider the percentage of the rest of the group members that are related to the group leader and then consider the degree of social ties between the group leader and his relatives. The degree of social ties utilizes 6 yes/no questions asked to group leaders; whether group members can get any type of help from other group members if needed, whether group members can count on each other to take care of a child if one needs to go away for a while, whether any group member

has visited other group members in the past week, whether any group member has had phone conversations with other group members in the past week, whether any group member seeks help from other group members to make a decision, whether any group member seeks mediation from others to solve a dispute with other group members. The number of yes responses to these questions comprises an index of social ties within the group as a whole. *LSocialties* is therefore the social ties of the group leader with his relatives in a group.[22] A similar measure, *GSocialties* considers the social ties among relatives in the rest of the group members.

The second proxy of social ties considers whether group members were in the same group since its inception. *Linception* is a dummy variable equal to 1 if the group leader was in the group since inception and *Ginception* is a dummy variable equal to 1 if at least two members of the rest of the group were in the group since inception.

3.7 Empirical Results

The following empirical analysis uses negative binomial models to estimate the effects of a number of independent variables on group repayment behavior, *Delinquency Intensity*. We test the effect of joint liability, screening and monitoring activities, and the social ties of the group leader on the repayment behavior of the group. We also test the effect of joint liability, the screening and monitoring activities, and the social ties of the rest of the group members on the repayment behavior of the group. This allows us to compare the role of the group leader with the role of the rest of the group members in affecting the repayment behavior of the borrowing group.

The negative binomial model derives from a Poisson distribution. In the Poisson model y_i has mean $\mu_i = \exp\left(x_i'\beta\right)$ and variance μ_i, signifying equaldispersion. However, the conditional variance in most applications is greater than the conditional mean. While such overdispersion does

[22] For example, if 50 percent of the rest of the group members are relative to the group leader and the social ties index is 6, then social ties of the group leader with his relatives, *LSocialties,* is 3, (50%*6).

not affect the poisson regression model estimates being consistent, such estimates are inefficient. The standard errors of the Poisson regression model will be biased downward which will over estimate the significance of the explanatory variables (Long 1997).

Overdispersion seems likely in our study because there are important explanatory variables that are difficult to capture (e.g., group members' income, group members' occupation risk level), and because error may exist in the estimates of some variables (pure randomness). *Delinquency Intensity* ranges in value from zero and 41. Approximately 85% of the sample takes values of 0, 1, 2, 3, or 4. The mean of the number of days of late repayment is 3.1 days with a variance of 40.26. The raw data are therefore overdispersed and the inclusion of the regressors does not eliminate this overdispersion in Poisson regression model indicating its inadequacy of fit. If overdispersion exists, a Poisson model is not appropriate and a negative binomial model can be used instead.

A negative binomial regression model includes a random error term ε_i representing the effect of omitted explanatory variables or pure randomness. In this model $\tilde{\mu}_i = \exp\left(\mathrm{x}_i'\beta + \varepsilon_i\right) = \mu_i \exp\left(\varepsilon_i\right)$ where $\exp\left(\varepsilon_i\right)$ is a gamma distributed random variable with mean one and variance α. If $\alpha = 0$, the negative binomial reduces to the Poisson distribution. The appropriateness of applying the Poisson model versus the negative binomial model can be assessed based on the statistical significance of estimate value of α.

Using the heteroscedasticity-robust standard errors, the negative binomial results are shown in Table 3.2. In this table, variables preceded by the letter *L* are the explanatory variables related to the group leader while variables preceded by the letter *G* are related to the rest of the group. Table 3.2 shows that there is a strong evidence of overdispersion. The dispersion parameter, α, is positive and significant at the 1% level. Alternatively, the computed likelihood ratio tests of overdispersion are even more highly significant.

Table 3.2: Negative Binomial Results

Variables	Coefficient	t-value
Constant	5.9355	(1.72)*
Control Variables		
Rephist	5.5541	(5.92)***
Branch	-0.8009	(-3.11)***
Joint Liability Variables		
LJointLiab	-6.2155	(-2.95)***
GJointLiab	-1.9482	(-0.65)
Screening Variables		
Lscreen1	-0.6007	(-1.58)
Gsreen1	0.3154	(0.47)
Lscreen2	-0.4310	(-2.10)**
Gscreen2	0.0475	(0.22)
Monitoring Variables		
Lsamebus	0.2797	(0.56)
Gsamebus	-0.2986	(-0.74)
Lphone	-0.2250	(-0.76)
Gphone	-0.0191	(-0.07)
Social Ties Variables		
Lsoicalties	-0.2768	(-2.15)**
Gsocialties	-0.1326	(-1.73)*
Linception	-2.3146	(-3.52)***
Ginception	0.7333	(2.15)**
Log Likelihood	-287.3405	
α	1.522 (5.41)***	
Likelihood-ratio test of α = 0		
chibar2(1)	346.26	
p-value	0.000	

Notes*: Delinquency Intensity*: The number of late days of repayment. Significance levels of 10, 5 and 1% are denoted by *, **, *** respectively.

Since the dependent variable involves late repayment at any time during the current loan cycle up until the interview took place, groups with longer history are more likely to run into repayment difficulties. The coefficient on *lnrephist,* the natural log of repayment history*,* is positive as expected and statistically significant. Groups with a longer history of repayment have a higher probability of late repayment. This probability increases at a decreasing rate as shown by the positive sign on the coefficient of *lnrephist*.

The variable *Branch* captures any difference in repayment behavior of group borrowers across the two branches surveyed. The coefficient on *Branch*, which is a dummy variable equal to one

if a group belongs to Al-Rusaifa's branch, is negative and statistically significant. The negative sign suggests that groups in Al-Rusaifa's branch have better repayment performance than those groups in Irbid's branch.

The signs on the joint liability variables of the group leader and the rest of the group members are negative. The negative signs on *LJointliab* and *GJointliab* strongly support the theories of Banerjee, Baseley and Guinnane (1994) over Stiglitz (1990) and Ghatak (1999) and the empirical work of Ahlin and Townsend (2005). The coefficient on the variable related to the group leader, *LJointliab*, is statistically significant while the coefficient on the variable related to the rest of the group members, *GJointliab*, is not. This indicates that the higher the joint liability of the group leader, the better the repayment performance of the group.

According to Banerjee, Besley, and Guinnane (1994), an increase in joint liability payment raises the marginal benefit of monitoring and develops more intense group pressure that reduces the number of days of late repayment. The empirical analysis provides statistical evidence that joint liability payment of the group leader is more strongly related to repayment performance than joint liability payment of the rest of the group members. That is, the higher the joint liability payment of the group leader the lower the days of late repayment. While the coefficient on the joint liability payment of the rest of the group members is negative, it is statistically insignificant. To our best knowledge, we are the first to use to this direct and accurate proxy for the joint liability payment and the first to record the positive impact of joint liability payment of the group leader on good repayment performance. [23]

[23] In Ahlin and Townsend (2005), the joint liability payment is measured for the group as a whole. The authors used the percentage of group members who don't own land as a measure for joint liability payment. The joint liability variable in Ahlin and Townsend was found to worsen repayment. The authors justify the use of this variable as a proxy for the joint liability payment by the following quote "One option the MFI has toward the end of the process of reclaiming delinquent loans is to seize assets of the borrower or guarantors, most often land. This fact leads to some variation in the actual degree of liability. If all group members own land, then there is less of a chance that a guarantor will in the end have to pay rather than the borrower himself, since the MFI can take his land. If on the other hand some members of

Through the group members' knowledge about each others' capabilities, assets and character traits, the practice of screening is expected to crowd in safer type of borrowers which improves the repayment performance of the group. In the MFW, groups form endogenously. After a group is formed, group members elect a group leader. Groups may then go through many loan cycles. Any group member may exit at the end of each loan cycle and new members may join. Screening therefore can take place when the group is first being formed and at the beginning of each loan cycle if a new member joins the group. The coefficient on the first screening variable of the group leader, *LScreen1*, is negative as expected but only marginally significant. The coefficient on the first screening variable of the rest of the group members, *GScreen1*, is positive but statistically insignificant. These empirical results suggest that it is the group leader's knowledge about the quality and sales of other group members' occupations that improves the group's repayment performance. The knowledge of the rest of the group members about the quality and sales of each others' occupations seems to have no impact on the group repayment performance.

The second measure of screening behaves similarly. The coefficient of the second screening measure of the group leader, *LScreen2*, is negative as expected and has strong predictive power on the days of late repayment. On the other hand, the coefficient of the second screening measure of the rest of the group members, *GScreen2*, is positive but has no predictive power on repayment. This suggests that the knowledge of the group leader about the rest of group members' assets and debts reduces the days of late repayment while the knowledge of the rest of the group members about each others' assets and debts has no significant impact on the days of late repayment.

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the group are landless, then the effective degree of joint liability can be thought of as higher, since it is more likely a guarantor will have to repay if a landless borrower defaults." However, one may argue that the higher the percentage of landless members in a group, the lower the capacity of this group to repay.

The empirical analysis provides statistical evidence that screening activities of the group leaders are more effective in reducing the number of days of late repayment than the screening activities of the rest of the group members.

While the majority of the coefficients on the monitoring variables hold the expected sign, none of these variables are statistically significant. The fact that the group leader shares the same type of occupation and has more phone communications with the rest of the group members seems to have no impact on group repayment performance. Also, the fact that the rest of the group members share the same occupation and have more phone communications with each other does not have any predictive power on the group repayment performance.

The last set of variables discussed is the social ties variables. The coefficients on the first measure of social ties, *LSocialties* and *GSocialties*, are negative as expected and statistically significant. The better the degree of social ties of the group leader with his relatives in a group and the better the degree of social ties of relatives among the rest of the group members, the lower the number of days of late repayment. Since default has a negative impact on the returns and future access to loans of other group members, and if members are sensitive to their existing social network, then borrowers (the group leader and the rest of the group members) will lessen their moral hazard behavior.

The coefficient on the second proxy of social ties for the group leader, *Linception*, is negative as expected and statistically significant. The fact that the group leader has been in the group since inception, an indication of good social ties with the rest of the group members, reduces the days of late repayment of the group relative to groups where the group leader is a new member in the group. The second measure of social ties among the rest of the group members, *Ginception*, has an unexpected positive sign and statistically significant. Groups that have at least two members since inception, other than the group leader, have more days of late repayment than groups with fewer members since inception.

Since *Gsocialties* and *Ginception* are both measures of social ties among the rest of the group members, the fact that *Gsocialties* improves the group repayment performance while *Ginception* worsens it seems to be contradictory. This contradictory result may stem from the fact that some regressors are highly correlated. To detect multicollinearity, and since there is no unique method of detecting multicollinearity, we use a few rules of thumbs. These rules of thumbs include checking the pair-wise correlations among regressors and using auxiliary regressions methods. Among other correlated regressors, the coefficient of correlation between *Lscreen2* and *Gscreen2* is 0.75 and it is 0.32 between *Linception* and *Ginception* with a significance level of 1% for both. In the auxiliary regression method, we adopt Klien's rule of thumb, which suggests that multicollinearity can be a problem if the R^2 obtained from the regression of Y on all other regressors is lower than the R^2 obtained from an auxiliary regression, that is, from the regression of X_j on the remaining regressors. The overall R^2 for the negative binomial model is 0.1211 while the R^2 of the negative binomial auxiliary regression of *Gscreen2* on the remaining regressors is 0.1379. The regression coefficients in Table 3.2 are altered when one of *Lscreen2*, *Gscreen2*, *Linception*, or *Ginception* is added or dropped, which is another possible evidence of multiconllinearity. Coefficients may have the wrong signs in the presence of multicollinearity.

No single solution is suggested to eliminate multicollinearity. However, as noted by Greene, "The obvious practical remedy (and surely the most frequently used) is to drop variables suspected of causing the problem from the regression, that is, to impose on the regression an assumption, possibly erroneous, that the "problem" variable does not appear in the model."[24] In Table 3.3, we deviate from the basic regression shown in Table 3.2 by; first, dropping the rest of the group related variables to estimate the group leader regression and second; dropping the group leader related variables to estimate the rest of the group members' regression.

[24] William Greene (2000, p. 258)

Table 3.3: Negative Binomial Results of the Group Leader and the Rest of the Group Members

	Group Leader		Other Group Members	
Variables	**Coefficient**	**t-value**	**Coefficient**	**t-value**
Constant	3.8192	(2.05)**	-4.7746	(-1.64)*
Control Variables				
Rephist	5.5745	(5.67)***	5.9667	(6.19)***
Branch	-0.6547	(-2.47)**	-0.5935	(-1.95)**
Joint Liability Variables				
LJointLiab	-5.0468	(-2.52)***		
GJointLiab			2.6962	(0.89)
Screening Variables				
Lscreen1	-0.6255	(-1.65)*		
Gsreen1			-0.1280	(-0.16)
Lscreen2	-0.3878	(-2.83)***		
Gscreen2			-0.1812	(-1.26)
Monitoring Variables				
Lsamebus	0.2859	(0.57)		
Gsamebus			-0.2996	(-0.74)
Lphone	-0.2620	(-0.83)		
Gphone			-0.1129	(-0.40)
Social Ties Variables				
Lsoicalties	-0.2494	(-1.73)*		
Gsocialties			-0.1674	(-2.14)**
Linception	-1.8172	(-3.37)***		
Ginception			-0.0418	(-0.09)
Log Likelihood	-290.40384		-299.05715	
α	1.620 (5.89)***		2.011 (6.03)***	
Likelihood-ratio test of α = 0				
Chibar2(1)	414.41		526.99	
p-value	0.000		0.000	

Notes: Delinquency Intensity: The number of late days of repayment. Significance levels of 10, 5 and 1% are denoted by *, **, *** respectively.

Using the heteroscedasticity-robust standard errors, the negative binomial results of the group leader and the rest of the group members separate regressions are shown in Table 3.3. Except for *Ginception* and the rest of the group measures of screening *Gscreen1* and *Gscreen2*, in terms of signs and significance levels the results of the separate regressions are comparable to the full model in Table 3.2. The reduction in collinearity in the separate regressions is clear. The screening measures of the rest of the group *Gscreen1* and *Gscreen2* enter with the expected negative sign but remain statistically insignificant. *Ginception* also becomes insignificant. All other results remain the same.

3.8 Summary of Results and Discussion

The empirical analysis provides evidence of the important and strong role of the group leaders in improving the repayment performance of the group as a whole. Most important, the empirical analysis provides evidence that the joint liability of the group leader is more strongly related to the repayment performance than the joint liability of the rest of the group members. The higher the joint liability of the group leaders is, the stronger are incentives for monitoring and pressure activities by the group leader, which leads to better repayment performance. We found no evidence that the joint liability of the rest of the group members has an impact in reducing the number of days of late repayment. This result has not been recorded before.

The role of the group leaders in screening is clear. The results show that it is the group leaders' knowledge of occupation quality, assets and debts of other group members that improves the repayment performance. We found no evidence that screening by the rest of the group members has a similar impact.

None of the monitoring variables of the group leader and the rest of the group members is significantly related to repayment performance. This is true for the full model, the group leader model, and the rest of the group members' model. The insignificant role of monitoring has also been found by Hermes, Lensink, and Mehrteab (2005).

The empirical results show that the social ties of the group leader with the rest of the group members as well as the social ties of the rest of the group members among each others improve repayment performance. While both measures of the social ties of the group leader reduce the number of days of late repayment, only one measure of social ties of the rest of the group members shows such an impact. This result is partially in line with the findings of Hermes, Lensink, and Mehrteab (2005). The authors found that it is only the social ties of the group leader with the rest of

the group members that improves repayment performance whereas the social ties among the rest of the group members have no impact.

How can we explain the different impacts of the group leader versus the rest of the group members on the repayment performance of the group? We propose three explanations. First, the results indicate that the joint liability payment of the group leader reduces the number of days of late repayment while the joint liability payments of the rest of the group members don't. An increase in joint liability payment of the group leader raises her marginal benefit of screening, monitoring, and enforcement activities. If the group leader performs these activities, the rest of the group members may free ride on the group leader efforts to improve the repayment performance of the group.

Second, the group leader is a representative or a spokesperson of the group who has to face the MFW officials in case of a repayment delay or default. Such a role may create a sense of responsibility and a source of pressure for the group leader to stay on a group wise good repayment behavior. This responsibility of the group leader may puts her under pressure to use her social ties and intensify her activities of screening, monitoring and enforcement to compel other group members to make their repayment on time leaving little incentive for the rest of the group members to exercise such activities.

Third, the intermediary function of the group leader between the group members and the MFW gives her a relative advantage in obtaining valuable information about the reputation, indebtedness and wealth of the rest of the group members. The group leader's relative advantage in obtaining information about the rest of the group members places her in a better position to screen borrowers. The screening ability of the group leader therefore can be more efficient than that of other group members. In other words, the group leader really uses his knowledge about other group members in the process of screening while other group members don't.

3.9 Conclusion

Existing theoretical models generally find that group lending improves repayment performance through its ability to mitigate asymmetric information, to generate a new mechanism of contract enforcement in the credit market and to exploit social ties among group members. In these models, it is assumed that all group members engage in screening, monitoring and enforcement activities and harness their social ties to improve repayment performance. In this paper we use data from a survey of 160 MFW borrowing groups to test whether the effectiveness of screening, monitoring and social ties on repayment performance differs across different group members. In particular, we investigate whether the provision of these activities and the joint liability payment effects on repayment performance differ between the group leaders and the rest of the group members.

The empirical analysis suggests that the joint liability payment of the group leader lowers the days of late repayment while the joint liability payment of the rest of the group members has no predictive power on repayment. To our best knowledge, we are the first to demonstrate the positive impact of joint liability payment of the group leader on repayment performance.

We found that the group leader plays a dominant role in screening. The empirical results suggest that the group leader's knowledge about the quality and sales of other group members' occupations improves the group's repayment performance while such knowledge among the rest of the group members has no impact on repayment. Similarly, we found that the knowledge of the group leader about the rest of group members' assets and debts reduces the days of late repayment while the knowledge of the rest of the group members about each others' assets and debts appears to be insignificant in explaining repayment.

The empirical results show no evidence that the monitoring activities of the group leader are different in explaining the repayment performance than those of the rest of the group members.

Variables measuring monitoring activities of the group leader and the rest of the group members enter insignificantly.

We also found that the social ties of the group leader with the rest of the group members and the social ties among the rest of the group members improve repayment. In particular, we found that the social ties of a group leader with his relatives and the social ties among relatives in the rest of the group members both reduce the days of late repayment. However, the fact that the group leader has been in the group since its inception, an indicator of social ties, improves repayment while inception among the rest of the group members show mix results.

The conclusion of the paper suggests that the group leader at the MFW seems to play a more important role in improving the repayment behavior of the borrowing groups than the rest of the group members. This research can be improved by considering some measures of group pressure related to the group leader and the rest of the group members. In particular, the research can be extended by testing whether the provision of pressure activities and their effects on repayment differ between the group leaders and the rest of the group members.

Chapter 4

Conclusion

In a case where borrowers lack collateral and verifiable credit history, group lending has been shown to mitigate the inherent problems associated with the asymmetry of information and the enforcement of loan contracts. While there is a host of theoretical models that focused on how group lending can overcome these problems, empirical research has lagged behind. This thesis uses data from a self designed survey that the researcher carried out in spring of 2005 to explore the factors contributing the success of group lending in achieving high repayment rates. We use the data to investigate whether group members improve repayment through their group-wise actions of screening, monitoring, enforcement, and the use of social ties among each others. In doing so, we first abide with the theoretical work that assume all group members work together in ensuring repayment. We then analyze whether the effectiveness of joint liability, screening and monitoring activities and the use of social ties differ between the group leader and the rest of the group members.

When we consider the theoretical models on group lending that assumes all group members work together to ensure repayment, the empirical results are consistent with vast majority of these models. The data suggest that group repayment is improved by screening, peer monitoring, group pressure, and social ties.

We found that group members that have better knowledge about each other occupation in terms of quality and sales are associated with better repayment performance. Different proxies for the pressure practiced by the group members show its positive impact in improving the repayment behavior of the groups. In contrast to previous literature, our results show that relatives in a group improve repayment. This supports the hypothesis that more relatives in a group ease the process of

monitoring and mitigates moral hazard. Consistent with the effect of relatives, we also find that social ties among group members improve repayment. This is one of the central findings of this paper. It is consistent with the theoretical predictions but contradicts the vast majority of the empirical literature.

We control for the effect of loan size and other socio-economics characteristics on repayment. We found that increasing loan size worsens repayment but further increase dampens it. Surprisingly, we found that education worsens repayment. We also found that access to more outside credit and group age worsens repayment while asset ownership seems to enhance the groups' ability to repay on time. We found that more religious borrowers are associated with lower days of late repayment.

In most group lending programs including the MFW, group members of a borrowing group select a group leader after the group is formed. Group leaders are assigned different tasks to perform in their groups. The data allows us to investigate whether the effectiveness of joint liability, screening and monitoring activities and the use of social ties effects on repayment performance differ between the group leaders and the rest of the group members.

The empirical results show that the group leader at the MFW plays a more important role in improving the repayment behavior of the borrowing groups than the rest of the group members. The joint liability payment of the group leader improves repayment while the joint liability payment of the rest of the group members lacks such a predictive power. To our best knowledge, we are the first to document this result. We found that the group leader's knowledge about the quality and sales of other group members' occupations improves the group repayment while such knowledge among the rest of the group members has no impact on repayment. Similarly, the group leader's knowledge about the assets and debts of other group members improves repayment while such knowledge among the rest of the group members does not. The empirical results show no evidence that the

monitoring activities of the group leader are different in explaining the group repayment behavior than those of the rest of the group members. We found that the social ties of the group leader with the rest of the group members and the social ties among the rest of the group members both improve repayment.

This thesis suggests that repayment performance of group lending institutions is likely to be more successful if group members screen and monitor each other, impose greater pressure and have stronger social ties. It also suggests that group lending institutions should recognize the important role played by the group leader in improving the overall repayment behavior of the group and take the necessary steps to enhance her role.

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Appendix

Cross Section MFW Group Questionnaire

A. Identification

A1 Visit #	**A2** Start Time	**A3** End Time	**A4** Month/Day	**A5** Visit Results

A5: Visit Results

1. completed and ready for data entry
2. partially completed
3. group leader unavailable
4. group leader refused interview
5. group leader provided unsatisfactory answers
6. others (specify)

A6 Name of Respondent _____	**A6** [ ]
A7 Sex of Respondent	**A7** Male, Female
A8 What is the most convenient phone number to reach the respondent at?	**A8** [ ]
A9 Whose phone number is this? 1. The respondent's home phone number 2. The respondent's partner phone number 3. Phone number of a relative 4. Others	**A9** [ ]
A10 Is the respondent the group leader? (1. Yes, 2. No) (If yes, go to A15, if no go to A11)	**A10** Yes, No
A11 Name of Group Leader_____	**A11**
A12 Sex of Group Leader (1. Male, 2. Female)	**A12** [ ]
A13 What is the most convenient phone number to call the respondent?_____	**A13**
A14 Whose phone number is this? 1. The leader's home phone number 2. The leader's partner phone number 3. Phone number of a relative 4. Others	**A14** [ ]
A15 Where is the branch office of the MFW that this group goes to? _____	**A15**
A16 What is the name of the MFW officer for whom this group talk to most often?_____	**A16**

B. Group Age

B1 When was this group established? Month/Year.	**B1** [ ]
B2 When was the first loan this group took since establishment? Month/Year	**B2** [ ]

C. Group Number

C1 How many members in the group?	**C1** [ ]

D. Loan Size

D1 For your group what is the current loan size?	**D1** [ ]
D2 For your group what is the duration of the loan in weeks?	**D2** [ ]
D2 Is the repayment due in monthly or biweekly installments?	**D3** [ ]

E. Interest Rate

E1 What is the interest rate on your current loan?	**E1** [ ]
E2 Would you prefer to borrow more at this interest rate? (If yes go to E3, if no go to F1)	**E2** [ ]
E3 How much would you prefer to borrow at this interest rate?	**E3** [ ]

F. Characteristic of the Group

F1. (Write the group members' names. Record first and last name. Ask the following questions to fill in the table)
F2. How old is this person?
F3. Is this person married? (1. Yes, 2. No)
F4. How many children this person have?
F5. What is the primary occupation of this person?
F6. How many Donums (Acres) does this person have?
F7. What is this person level of education? (1. read 2. Elementary 3. Preliminary 4. High school 5. Two year college, 6. Four year college 7. Master)
F8. Does this person have a home phone? (1.Yes, 2. No)
F9. Does this person have a cell phone? (1. Yes, 2. No)
F10. Has this person been in the group since the group started? (1.Yes, 2. No)
F11. Does this person pray five times a day? (1. Yes, 2. No)
F12. Does this person observe Ramadan? (1. Yes, 2. No)
F13. Does this person observe the morning prayer on time? (1. Yes, 2. No)

#	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13
1													
2													
3													
4													
5													
6													

G. Screening

G1. Has anyone ever been rejected to join the group? (1. Yes, 2. No) (If yes go to G2 if no go to G3)	**G1** [ ]
G2. If so why?	**G2**
G3. Are there people who would like to join the group but cannot? (1. Yes, 2. No) (If yes go to G4 if no go to G5)	**G3** [ ]
G4. If so why?	**G4**
G5. Is the group leader aware of the quality and sales of other member's work? (1. Yes, 2. No)	**G5** [ ]
G6. Is the group leader aware of the following: **G6.1** Debt and savings that members have with the MFW **G6.2** Debt and savings that members have with banks other than MFW **G6.3** Debt that members have with other individuals **G6.4** Assets (i.e. land, autos, etc.) that members have	 **G6.1** [ ] **G6.2** [ ] **G6.3** [ ] **G6.4** [ ]
G7. Are other group members aware of the quality and sales of other member's work (1. Yes, 2. No)	**G7** [ ]
G8. Are other members aware of the following: **G8.1** Debt and savings that members have with the MFW **G8.2** Debt and savings that members have with banks other than MFW **G8.3** Debt that members have with other individuals **G8.4** Assets (i.e. land, auto, etc.) that members have	 **G8.1**[ ] **G8.2**[ ] **G8.3**[ ] **G8.4**[ ]

H. Monitoring

A. Pair Wise Relatives

H1A. (In the first row and first column, write the group names. Make sure that names are written in the same order in both the first column and the first row.)
H2A. Is person 1 a close relative of person 2, 3, 4, 5, 6? (1. Yes, 2. No). Is person 2 a close relative of 3, 4, 5, 6? (1. Yes, 2. No). Is person 3 a close relative of 4, 5, 6? (1. Yes, 2. No). Is person 4 a close relative of 5, 6? (1. Yes, 2. No). Is person 5 a close relative of 6? (1. Yes, 2. No).

Name	1.	2.	3.	4.	5.	6.
1.	0					
2.		0				
3.			0			
4.				0		
5.					0	
6.						0

B. Pair Wise Distance between Places of Work.

H2B. (In the first row and first column, write the group names. Make sure that names are written in the same order in both the first column and the first row. Write distances in kilometers)
H2B. How far is person 1 business from 2, 3, 4, 5, 6 businesses? How far is person 2 business from 3, 4, 5, 6 businesses? How far is person 3 business from persons 4, 5, 6 businesses? How far is person 4 business from 5, 6 businesses? How far is person 5 business from 6 business?

Name	1.	2.	3.	4.	5.	6.
1.	0					
2.		0				
3.			0			
4.				0		
5.					0	
6.						0

H3. Has any group member ever used his loan for purposes other than business expenditures? (1. Yes, 2. No)	**H3** [ ]

J. Cooperation

	Closely Related Group Members	Unrelated Group Members
J1. In the past 8 months, has anyone in the group coordinated with_____ to choose the place of business?		
J2. In the past 8 months, has anyone in the group referred a customer to _____?		
J3. In the past 8 months, has anyone in the group helped_____ with free labor?		
J4. In the past 8 months, has anyone in the group helped_____ with money?		
J5. In the past 8 months, has anyone in the group coordinated with_____ to buy input goods?		
J6. In the past 8 months, has anyone in the group coordinated with_____ to sell goods?		

I. Outside Credit Options

I1. How many members in the group have access to other credit sources (from banks)? *(If there is any one member who has access to other sources of credit (from banks), then go to I2, if not, go to I3)*	**I1** [ ]
I2. Why did they choose to borrow from the MFW rather than from other banks?	**I2** [ ]
I3. How many members in the group have access to other credit sources (from individuals)? *(If there is any one member who has access to other sources of credit (from individuals), then go to I4, if not, go to K1)*	**I3** [ ]
I4. Why did they choose to borrow from the MFW rather than from other individuals?	**I4** [ ]

K. Social Ties

K1. Can you get help from your group member when you need it? (1. Yes, 2. No)	**K1** [ ]
K2. If you were caring for a child and needed to go out for a while, would you ask your group member for help? (1. Yes, 2. No)	**K2** [ ]
K3. Have you visited a group member in the past week? (1. Yes, 2. No)	**K3** [ ]
K4. In the past week, how many phone conversations have you had with your group members?	**K4** [ ]
K5. If you need information to make a decision, do you talk to your group member to find that information? (1. Yes, 2. No)	**K5** [ ]
K6. If you have a dispute with your group member, are you willing to seek mediation from others? (1. Yes, 2. No)	**K6** [ ]
K7. Do you prefer to buy or sell goods or services from other group members or from other individuals? (1. From group member, 2. From other individuals)	**K7** [ ]

L. Group Pressure

L1. If a group member is late in repaying, are group members willing to pressure him to repay? (1. Yes, 2. No)	**L1** [ ]
L2. Do group members feel practicing such pressure is difficult? (1. Yes, 2. No)	**L2** [ ]
L3. Do group members feel moral obligations to repay group loan? (1. Yes, 2. No)	**L3** [ ]
L4. Do group members repay to stay on good terms with group? (1. Yes, 2. No)	**L4** [ ]
L5. Is there any internal code to punish a group member who defaults? (1. Yes, 2. No)	**L5** [ ]

M. Delinquency Issues

M1.**(internal incidence of delinquency)** In the past 8 months, was there any group member who was not able to manage getting his biweekly or monthly installment? (1. Yes, 2. No) (if Yes, go to M2, if no, go to M3)	**M1** [ ]
M2. Did the group help this person to collect the required installment? (1. Yes, 2.No)	
M3. (external incidence of delinquency) In the past 8 months, was there any group member who did not pay his installment to the MFW on time? (1. Yes, 2. No)	**M2** [ ]

Vita

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